A SURVEY OF HEARING AID USERS AND THE ESTABLISHMENT AND EVALUATION OF A HEARING AID REHABILITATION PROGRAM IN THE CHRISTCHURCH REGION.

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ABSTRACT

The performance of the Christchurch Hearing Aid Clinic was investigated by examining the levels of hearing aid use, satisfaction, performance and aid-specific knowledge of 169 people issued with their first hearing aid from the Clinic between 1986 and 1990.

Analysis revealed a need for a more comprehensive rehabilitation service. Time constraints placed on the Clinic meant that using an external agency was a logical choice as the provider of this rehabilitation. As a result, a combined rehabilitation programme using the existing services offered by the Hearing Aid Clinic and three additional rehabilitation session run by the Hearing Association was implemented.

The benefits of the additional rehabilitation were illustrated by the significantly greater level of hearing aid use of the 27 rehabilitated subjects compared with 37 control subjects who received their aid in the normal fashion from the Clinic. Other criterion measures used to evaluate the two delivery systems, including the changes in hearing handicap and the level of aid specific knowledge and manipulation abilities, along with satisfaction ratings and ratings of aid performance, did not show any significant difference between the two groups. However, due to experimenter effects, the possibility exists that the control groups' performance was elevated above what is normal for subjects receiving an aid from the Clinic. Discrepancies between the control group and survey population, neither of which received additional rehabilitation, support this view.

It was concluded that a formal arrangement needs to be established between the Hearing Aid Clinic and the Hearing Association so that people in need of help in adjusting to their newly acquired aid receive the best possible chance of obtaining optimum use and satisfaction.

CHAPTER ONE

GENERAL INTRODUCTION.

1-1. Introduction.

Based on extrapolations from overseas studies, the authors of the Hearing Report (1984) estimated that there were approximately 430,000 New Zealanders with mild to moderate hearing loss in their better ear (25 dB and over), 25,800 with severe hearing loss (greater than 65 dB) and 6,700 with profound hearing loss (greater than 85dB). In an attempt to bring this figure up to date, Table 1 depicts a low, middle, and high estimate of the amount of hearing impairment in New Zealand based on United States figures (Goldstein, 1984) and a New Zealand population of 3.3 million. These percentages take into account variances in estimates due to the sound frequencies used to determine loss, variations in the level above which a significant hearing loss is said to exist, and the inclusion of people with a unilateral impairment. It also takes account of age, the method by which the information was gathered, and whether hearing impairment was determined by pure tone audiometry or speech stimuli.

Table 1

Range of Prevalence of Hearing Impairment Estimates Applied to the New Zealand Population. (N=3.3 Million).

Estimate of Overall Prevalence.	LOW	MED	HIGH
Prevalence in Percent.	7.6	13.5	17.4
Number.	250,800	445,500	574,200

Unfortunately, just how many of these have been fitted with a hearing aid is unknown. Brooks (1989a) estimates that one-sixth of the British population who might benefit from an aid actually have such an instrument. Using an average aid life expectancy of 3.7 years, the number of aids sold per year, and the proportion of aids sold which were binaural fittings, Goldstein (1984) has calculated a take-up rate of between 6.2% and 14.3% in the US. In other words, there is an unmet need that may be as high as 93.8%.

Why is the take-up rate so low? Brooks (1989a) maintains

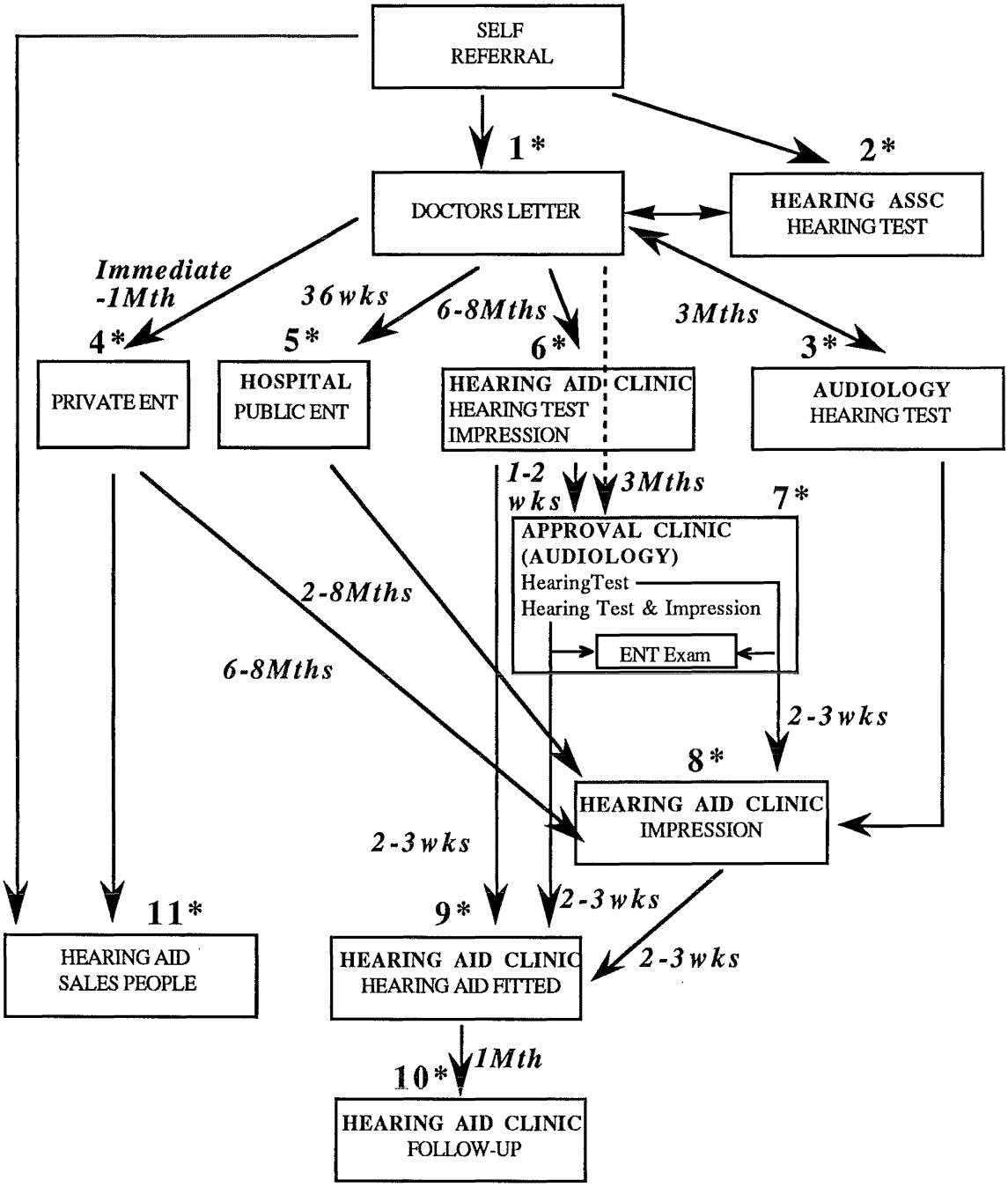
> ...there is little doubt that hearing aids have had a poor image in the past, especially hearing aids supplied to the elderly. Usually the decision to obtain help through amplification is delayed for many years. In consequence, those obtaining aids are less adaptable, less dextrous, less motivated and less able to cope with the task of hearing-aid orientation. Performance tends to be well below optimum, and the hearing aid (not the user, or the system, *or the lack of instruction* [italics added]) is blamed. (p.14-15)

In essence, this author maintains that delays lead to poor performance which result in a poor image which then leads to further delay and so a vicious spiral is created. When one considers that technology has considerably improved both the appearance and performance of modern hearing aids, what is needed therefore is earlier referral (unfortunately, doctors lack of awareness of the day-to-day effects of hearing disability - Tanaka, 1984 - means that they can be instrumental in blocking the system) and hence younger, more adaptable and dextrous subjects, and appropriate rehabilitation in order to maximise an aid's potential so that this spiral can be broken.

The question then becomes one of determining whether the rehabilitation on offer is indeed appropriate, and, if not, how it can be improved. Answering these questions in relation to the Christchurch Hearing Aid Clinic is the focus of this research. As a first step, it is necessary to detail the current aid delivery system operating in Christchurch.

1-2. Issuing Hearing Aids In Christchurch.

Figure 1 provides an overview of the procedure for issuing hearing aids that was in operation at the commencement of this research. The situation was complicated when, seven weeks into the project, two of the three audiologists established their own private practice, but, fortunately, the issue procedure remained essentially the same except that private practice is now responsible for all patients funded by either the Accident Compensation Corporation (A.C.C.) or a War Disablement Pension (W.D.P.) whereas the Hearing Aid Clinic caters for those patients who pay for their own hearing aid.



Note. The above time intervals are typical waiting times.

Figure 1: ***Flow Chart of Hearing Aid Issue In Christchurch.***

1-2-1. THE REFERRAL PROCESS.

1* Doctors who conduct their own hearing tests decide whether or not patients need to be referred on for expert assessment. If further

action needs to be taken, the doctor and patient together must decide whether to go via the public system (which, at the end of August 1991, meant waiting approximately 36 weeks, or 16 weeks in semi-urgent cases, for an otological examination performed by an Ear, Nose, & Throat [ENT] specialist), or by way of a private ENT clinic that reduced waiting time but increased costs. If however, the hearing loss is a straight forward case such as presbyacusis (hearing loss associated with increasing age), then the doctor may bypass ENT completely and the waiting that this appointment involves, and refer the patient directly to the Hearing Aid Clinic.

2*/3* Doctors who do not conduct their own hearing tests may send their patients to either The Hearing Association or the Public Hospital Audiology Department for a test. The Hearing Association will then send an audiogram and covering letter to the doctor concerned, who subsequently decides whether or not an aid is required, and, if so, whether to send the patient directly to the Hearing Aid Clinic, or for an ENT examination. Some patients (those who both require an aid and have no complicating factors associated with their hearing loss) who are tested at the Audiology Department will be referred by this department to the Hearing Aid Clinic and the patient's doctor will be notified of this. If an audiologist at the Department feels that an ENT examination is necessary, then the doctor concerned is notified. It is then up to the doctor to make an ENT appointment.

4*/5* Following an examination from either a private or public ENT specialist, patients deemed suitable for an aid are referred to the Hearing Aid Clinic so an ear impression can be taken. The waiting period varies from two to eight months depending on circumstances. Patients over 80 are short-listed to ensure they wait only two months.

6* All patients referred directly from a doctor to the Hearing Aid Clinic receive an audiological examination that includes both bone and air conduction pure-tone audiometry, and may also involve impedance testing, and, in cases where simply amplifying sound is suspected to be of limited benefit, speech testing using phonetically balanced AB word lists. An appointment is then made either to attend an Approval Clinic (located in Audiology) or to return to the Hearing Aid Clinic for fitting an aid.

7* The Approval Clinic with its associated ENT examination is necessary for patients who wish to receive the $89.10 government hearing aid subsidy. Even though all subjects attending the Approval Clinic are Hearing Aid Clinic patients, some come by way of the Hearing Aid Clinic as described above, whereas others (usually the elderly or those with transport difficulties) bypass this appointment and go directly to the Approval Clinic, where they receive a Hearing Test and an ear impression. Following the audiological examination all direct-referred and Hearing-Aid-Clinic-referred patients whose condition, the audiologist believes, requires further investigation, will be examined by an ENT specialist. If nothing unusual is detected, an appointment to be fitted with an aid at the Hearing Aid Clinic is made for those who have had an impression taken. Some patients, such as those with wax build-up, who can not have an impression taken at this stage, also receive an appointment to attend the Hearing Aid Clinic, for an ear impression.

8* Patients referred from either public or private ENT, Audiology, and the Approval Clinic have an ear impression taken at the Hearing Aid Clinic.

9* Two to three weeks after the impression is taken, patients are fitted with their aid at the Hearing Aid Clinic. They are then given approximately one month to try out their new aid.

10* After this trial period, some patients telephone to say they will keep their aid, and the rest return to the Clinic to either try out a different aid or return their aid as they have decided that they do not wish to wear such a device.

11* Some individuals choose to bypass much of the system and instead go directly to a private Hearing Aid Dealer. Although less time is involved, Hearing Aids obtained in this fashion are considerably more expensive than those purchased through the Clinic. If these patients wish to obtain the Government subsidy, then they can receive the necessary ENT examination from either a Private ENT Clinic or through the Approval Clinic.

At the time of writing (March 1992) the Hearing Aid Clinic was in a further state of flux following the loss of its third and only remaining audiologist,

and the relocation to premises that remain to be adequately fitted for audiological purposes. In addition, the Hearing Aid Clinic has now split from Audiology.

1-3. How Can the Effectiveness of a System for Rehabilitating the Hearing Impaired be Assessed?

1-3-1. Reduction In Hearing Handicap.

It is possible to evaluate the performance of a hearing aid delivery system in a number of different ways. Benefit, which Oja and Schow (1984) define as "...the improvement in some measure in the aided condition as compared to the unaided condition" (p. 77), is one such way. Measures may include the aided threshold gain, improvement in speech perception, or reduction in hearing handicap. A fundamental criticism of the more traditional measures of gain achieved by an aid and improvement in speech perception is that these laboratory based assessments do not reflect benefits related to communication in the living world. For example, speech presented in the absence of background noise is unrepresentative of normal human communication. Schow & Gatehouse (1990) point out that while standard audiological sensitivity and speech recognition (discrimination) scores give us useful information about basic hearing abilities, making inferences from these data to predict the effect upon daily living presents a difficult challenge.

The term hearing handicap refers to the disadvantage resulting from an impairment or disability that prevents or limits the fulfilment of a role that is normal for a given individual (Stephens & Hétu, 1991). Therefore, similar degrees of hearing loss may produce quite different amounts of handicap in different individuals. For example, a relatively small hearing loss may provide little handicap to an independent, self-contained elderly person living with a thoughtful and caring family. The same degree of loss might be crippling to an executive who depends critically on obtaining accurate information at board meetings and over the telephone. Brooks (1989b) argues that reduction of hearing handicap is an especially appropriate measure of the effectiveness of rehabilitation procedures as it is handicap, rather than impairment, that determines the quality of life for the individual with hearing loss. In a similar fashion, Weinstein (1984) suggests

that,

> In that a major goal of rehabilitation is to facilitate psychosocial adjustment to hearing impairment, self-assessed hearing handicap may be a realistic measure of the effectiveness of auditory rehabilitation. (p.106)

Which Handicap Measure and Why.

Several authors (Birk-Nielsen & Ewertsen, 1974; Brooks, 1979; Tannahill, 1979) have employed self-assessment measures as criterion indicators against which to judge hearing aid benefit. For the most part, these investigators have demonstrated a reduction in self-perceived hearing handicap following use of amplification (Brooks, 1979; Tannahill, 1979). However, Newman & Weinstein (1988) question the validity of these studies as test-retest reliability data were not available on the measuring instruments used to assess perceived handicap. Tannahill used High, Fairbanks, & Glorig's (1964) "Hearing Handicap Scale". Birk-Nielsen & Ewertsen used their own (1973) "Social Hearing Handicap Index". Brooks, who, considered a number of questions of the Social Hearing Handicap Index inapplicable to National Health Service (NHS) patients as well as lacking in information about environmental aspects of hearing, modified this scale to produce the "Weighted Index of Social Hearing Handicap." Adequate test-retest reliability ensures that changes in hearing handicap scores truly reflect rehabilitation efforts, rather than a lack of reliability of the measuring instrument (Demorest & Walden, 1985; Weinstein, Spitzer, & Ventry, 1986).

The Hearing Handicap Inventory for the Elderly - HHIE - (Ventry & Weinstein, 1982) is a self-assessment tool that assesses the emotional and social effects of hearing loss in the elderly (Weinstein, 1991). It differs from other scales in that it focuses specifically, and was standardised on, elderly people (65 years of age and older). The psychometric adequacy of this inventory strengthens its potential as a measure of perceived hearing aid benefit. Specifically, in addition to high internal consistency (0.88-0.95, Ventry & Weinstein, 1982), the HHIE has high test-retest reliability when administered using face-to-face ($r=0.96$), paper and pencil ($r=0.84$) (Weinstein, Spitzer, & Ventry, 1986) and face-to-face followed by paper and pencil format ($r=0.94$) (Newman & Weinstein, 1989). Given this high test-retest reliability, Newman & Weinstein (1988) argued that any change in perceived handicap on the HHIE would most probably represent a true

change in the judgement of handicap resulting from intervention. As such, the HHIE may be appropriate as a baseline measure against which success or failure of rehabilitative intervention with hearing aids may be judged in older adults.

Recent studies using the HHIE have also demonstrated a statistically significant reduction in self-perceived hearing handicap following use of amplification (Malinoff & Weinstein, 1989; Mulrow et al., 1990; Newman & Weinstein, 1988). From these studies, Weinstein (1991) concluded that a change in perceived handicap as measured by the HHIE holds promise as an objective index of hearing aid benefit in older adults. As a result, the focus has shifted from simply demonstrating that the HHIE is a valid measure of benefit to establishing an appropriate time for such an assessment.

As hearing handicap measures rely on self-assessment, their strengths and weaknesses are those associated with this form of assessment. According to Noble (1978) three main theoretical advantages of self-report are that it can be a representative, meaningful, and nonassumptive method of hearing assessment. The representative quality is captured by including items regarding aspects of everyday hearing experiences and problems of impairment that hearing impaired people themselves have identified. By contrast, Noble argues,

> ...the representativeness of a mechanical test springs from the theoretical orientation of the people devising that test, and the representativeness of assessment systems likewise expresses only what the systems' makers consider to be important qualities of hearing. (p. 307)

Meaningfulness is attainable in self-report by ensuring that items do refer to situations relevant and meaningful to the people being questioned.

The most obvious practical advantage of self-assessment is that no special equipment or elaborately controlled environment is needed to obtain the information and it can be conducted at any time. A further practical advantage of self-assessment is that it permits the variable influences of compensatory skill (for example, the ability to lip-read) to mediate the response that a person will provide. A test that assesses only auditory function overlooks this sort of intermediate variable and thus does not truly reflect the difficulty experienced in everyday circumstances.

Noble (1978) considers that, among the theoretical disadvantages of self-report probably the two most critical are variability in verbalizing phenomenal experience and change in cultural climate. Indeed, it could be said that the strengths of self-assessment are also its weaknesses. In gaining first-hand knowledge from the person about life experience, one enters the troubled area of meaning and the translation of feeling into terms that may or may not precisely match that feeling and may or may not match across people.

The major practical disadvantage of self-assessment is that respondents may fake an appraisal to give the impression of being worse or better off than they know themselves to be. In addition, if the self-assessment takes the form of an interview, then all the problems associated with interviews will come into play. More precisely, different styles and skills of interviewers, their willingness to negotiate with respondents about meaning and relevance, the social exchange whose character is bound to vary depending on the mutual regard of each party to the interview must all affect the responses and scores made.

As well as the advantages and disadvantages that accompany self-assessment, the HHIE has its own particular strengths and weaknesses. One such weakness is that it does not ask the client to state what priority he or she attaches to each disabling aspect of a hearing loss. For example, a hearing loss may make it difficult for a client to attend religious services or parties. Depending on other social factors, one of these activities may be far more important to the client than the other. Other possible disadvantages associated with the HHIE include its simplistic response system, the absence of occupational items, and the fact that the standardisation process limits the questionnaire to the elderly (Weinstein, 1984). However, if the population under investigation is actually elderly then these weaknesses become the HHIE's strengths.

In sum, many audiologists have begun to appreciate the value of self-assessment measures in the last decade. Furthermore, during the last few years, as some of the most respected professionals in audiology have taken up the effort (Giolas, Owens, Lamb, & Schubert, 1979; Jerger & Jerger, 1979; Stephens, 1980), the use of self-assessment has definitely acquired more credibility as a large arsenal of self-assessment tools has been developed (see Schow & Gatehouse 1990 for a list including a comparison of features). The selection of one particular self-assessment inventory - the

HHIE - was based on several factors, including:

1. Its established psychometric adequacy.

2. The fact that the questions were targeted at the elderly.

3. The questionnaire length was reasonable.

4. Its administration and scoring ease.

1-3-2. THE LEVEL OF HEARING AID USE.

Plomp (1978) summarised the results of several studies related to use. He stated that 60 to 90% of the hearing impaired used their hearing aids always or frequently, 5 to 30% occasionally and 5 to 10% never. Upfold &Wilson (1980), using data from the 1978 Australian Bureau of Statistics Survey of 63000 people, found that 56.7% of people with aids were consistent users, employing them more than 4 hours per day (hpd), while 22.1% made little or no use of the aid. Stevens (1977) who reviewed 29 hearing aid surveys found that use rates varied substantially depending on the country from which the research originated. For example, between 41.2% and 69.7% of patients in nine British studies used their aids never or only occasionally, whereas these use figures varied from 10 to 24% in 11 Danish studies. The availability of more extensive rehabilitation in Denmark was used to explain the differences. Hutton (1982) reviewed reported values for mean daily use for moderate loss clients and found that one author (Brooks 1979) reported 1 to 2 hours, others (Carstairs, 1973; Haggard, Forster, & Iredale, 1981; Ward, Tudor, & Gowers, 1978) reported 6 to 7 hours and still others (Hutton, 1980; Kapteyn, 1977) reported 9 to 11 hours. According to Oja & Schow (1984), the interpretation of these use figures is difficult because some of the crucial factors (e.g., subject mobility, communication needs) which relate to each individual's use of the hearing aid were not measured. Also, Haggard et al. (1981) warn that use of a hearing aid should be defined relative to the person's need for communication rather than simply as the total time the aid is in use per day. A fundamental criticism of this measure therefore, concerns the fact that low use of amplification may be due to many factors (such as life-style) other than rehabilitation. For example, someone who is totally satisfied with their aid may use it for only 1 or 2 hours per week, specifically so as to take a more active role in a weekly board meeting.

In spite of this possibility, Upfold & Wilson (1980) state that, "While aid use does not necessarily signify benefit or effective rehabilitation, the relationship may be argued to be strongly positive, particularly when there is little or no aid use" (p.35), and Brooks (1989b) indicates that use, which is not only a relatively easy parameter to assess, but also seems logically to relate to the value of the aid to the user, is the most reliable measure at the present time for assessing the success of different delivery systems.

1-3-3. SATISFACTION WITH THE AID.

Since satisfaction with a hearing aid is rather subjective and therefore difficult to quantify, there is great disparity in the ways satisfaction has been defined and studied. Two approaches to the assessment of satisfaction have been utilised: (1) a response is sought from the client which is supposed to represent satisfaction in general (Brooks, 1985; Henrichsen, Noring, Christensen, Pedersen, & Parving, 1988; Henrichsen, Noring, Lindemann, Christensen, & Parving, 1991; Kapteyn, 1977; Oja & Schow, 1984; Parving & Boisen, 1990); and (2) responses are sought regarding a variety of factors assumed to be related to satisfaction. Gerber & Fisher (1979), for example, had subjects complete a 10 item questionnaire evaluating communicative skills, both aided and unaided under various situations. The difference in aided and unaided responses was taken as a subject's satisfaction score. The first approach appears to be a more reasonable one since the second approach does not directly assess the client's satisfaction. However, there appears to be little agreement on what form the response scale should take. Some authors (Brooks, 1985; Kapteyn, 1977) have used a 10 point scale. A 7 point scale was used by Oja & Schow (1984) to assess satisfaction levels, and several Danish studies (i.e., Henrichsen et al., 1988; Henrichsen et al., 1991; Parving & Boisen, 1990) used a 4 point scale.

The major limitation associated with using satisfaction as a measure of delivery success is that it is a relative term. If expectation is low, then a marginal improvement in hearing ability may result in relatively high satisfaction, and vice versa. However, Brooks (1989b) suggests that as it does reflect the feelings of the user satisfaction should be accorded some measure of acceptance.

1-3-4. HEARING AID PERFORMANCE.

As well as the amount of use and the level of satisfaction attained, Brooks

(1990) used the self-rating of the performance of the instrument as a means of evaluating the outcome of hearing aid fitting. In particular, performance was assessed by asking the individuals to rate their aided hearing on a five-point scale for hypothetical situations. The theoretical maximum score is 25, theoretical because few persons with perfect hearing will honestly rate their hearing as "very good" in the fifth postulated condition - with a group in noisy conditions. When 125 persons with normal hearing were asked to rate how well they heard in the five specified settings, the median score was 22, not 25 (Brooks, 1984).

In sum, Brooks (1990) concludes that,

> If we accept that the hearing aid user's assessment of the effectiveness of the aid is a realistic, albeit not very precise, method of indicating "benefit", then use, satisfaction and performance appear to be reasonably relevant tools for quantifying "benefit". (p. 231)

Not only are these measures relevant, but Brooks (1990) has demonstrated their repeatability and Henrichsen et al. (1991), using a 4 year longitudinal research design, has demonstrated the stability of use and satisfaction levels. To determine the reliability of these 3 measures, Brooks (1990) sent the same questionnaire to 32 patients 10-14 days after they had returned the original questionnaire. Although there were some small changes in responses none were significantly different, which indicates that benefit can be assessed subjectively with an acceptable degree of reliability.

1-3-5. The Level of Hearing Aid Knowledge & Manipulation Skills.

Another possible way to evaluate the performance of a delivery system is via the level of hearing aid specific knowledge and manipulation skills. If, for example, a patient is unable to insert his or her aid, does not know how to change the battery or where batteries can be obtained, what the switches on the aid are for, or how to clean the aid, then the delivery system could be described as less than adequate.

1-3-6. Direct Approach.

Perhaps the most obvious way to assess the performance of a Hearing Aid Delivery system is to simply ask the user what they thought of the service

provided.

In this fashion, Pou, Snelling, & Vekovius, (1981) used four questions to assess 400 patients' satisfaction with Clinic services and costs. Results showed that 96% felt that their hearing problem was adequately explained to them prior to being fitted with an aid and a similar 97% felt that the counselling they received during their hearing aid fitting adequately prepared them for satisfactorily using their aid. Almost half (45%) indicated that their aid had been sent for repairs and the majority (89%) thought that the cost of the hearing aid and services was appropriate.

Although Pou et al's results give the impression of an effective delivery system, they are likely to be biased in a positive direction because of the low return rate (400/1100; 36.4%). It is possible for example, that the majority of subjects were less than satisfied with the service provided and did not return the survey for that reason. Even if this was not the case, Sorri, Luotonen, & Laitakari's (1984) finding that both users and non-users were satisfied with the amount of instruction they had received suggests that we cannot rely solely on the opinion of the hearing-handicapped when judging the performance of a hearing aid delivery system.

In addition, as is the case for satisfaction with the aid, satisfaction with a Clinic is likely to be biased by a number of factors not directly related to the Clinic's performance. For example, one subject's expectations and subsequent performance of an aid may lead him to view the Clinic in a positive light whereas a second person, receiving an identical service, may be dismayed with her aid's performance and in turn consider the Clinic inadequate.

In sum, if a delivery system is to be evaluated in a direct fashion then, at the very least, responses need to be gained from a substantial majority of those surveyed and should be interpreted with caution.

CHAPTER TWO

SURVEY INTRODUCTION.

2-1. Examination of the Christchurch Public Hearing Aid Delivery System.

The primary motivation for the current survey was to assess the effectiveness of the Christchurch Hearing Aid Clinic to establish whether or not a more comprehensive rehabilitation program was required. Specific measures used to perform this assessment included the level of hearing aid use, satisfaction, performance, and knowledge. In addition, subjects were required to directly assess the Clinic's performance. As this survey was only carried out once, none of the change measures, (e.g. the reduction in hearing handicap) could be used and, additionally, as the survey was posted, an assessment of aid manipulation skills was not possible.

Awareness of the "Hearing Association", a voluntary organisation that, according to the Hearing Report (1984), provides the only rehabilitative services for adults with acquired hearing loss, was also assessed to establish whether or not any links were perceived between this organisation and the Clinic. Opinions of the service provided by the Hearing Association were sought to guide the development of a combined rehabilitation program involving both the Hearing Aid Clinic and the Hearing Association if the survey revealed that the rehabilitation services offered by this organisation were required.

The third purpose of the survey was to discover the factors that differentiated unsuccessful from successful users issued with an aid from the Christchurch Clinic so as to assist with the planning of services.

The literature identifies several factors that may influence the real or apparent amount of use made of hearing aids. The poorer the hearing, the more the patient will use his aid (see Stephens, 1977; Upfold & Wilson, 1983). However, this relationship is not consistent (Hickson, Hamilton, & Orange, 1986; Kepteyn, 1977; Surr, Schuchman, & Montgomery, 1978). Women use their aids more frequently than males but the difference is small. (E.g., see Ewertsen, 1974; Kapteyn, 1977; Sorri et al., 1984; Upfold & Wilson, 1983.) There is either no significant effect of age (Carstairs,

1973; Ewertsen, 1974; Hickson et al., 1986; Kapteyn, 1977; Upfold & Wilson, 1983; Henrichsen et al., 1988; Parving & Boisen, 1990), or a significant decrease in use with increasing age (Bicknell & Davis, 1968; Kodicek & Gerrard, 1954; Aasen, 1970 - all cited in Stephens, 1977).

In addition, three studies have considered the effect of the type of hearing aid (see Appendix 1 for a summary of the different aid types) on the amount of use (Ewertsen, 1977; Kaaren & Backstrom, 1967; Pohl, 1973 - all cited in Stephens, 1977). In all three studies, body worn aids were used more than spectacle and postaural aids. Stephens (1977) suggested that this is a result of body worn aids usually being prescribed for patients with severe hearing losses in all three countries in which these studies were carried out (Sweden, Germany and Denmark). In a similar fashion, Upfold & Wilson (1983), who found no statistically significant difference ($p>0.05$) between the use of any combination of aid types (Body, In-the-Ear [ITE], Behind-the-Ear [BTE], and Spectacle), remarked that the interpretation of this finding is complicated by the reasons for having one aid rather than another. These reasons, rather than some characteristics of the aid type, may account for the differences in use rate. For example, the severely deaf may have possessed body aids because of feedback risks with BTE aids, but the aid use rate might be related to the severity of the hearing problem rather than the body aid. More recently, Sorri et al. (1984) discovered that BTE aids were used more regularly than body-worn aids in 150 of 215 people originally fitted with an aid during 1975 and 1976.

Stephens' (1977) review also revealed that five of six studies (Bicknell & Davis, 1968; Carstairs, 1973; Djupesland, 1961; Ewertsen, 1974; Kodicek & Garrad, 1955) showed greater use of aids by patients with conductive disorders. Similarly, Sorri et al. (1984) reported that an aid was used less if the hearing loss was sensorineural. These findings support the premise that patients with middle ear problems (i.e., a conductive hearing loss) will not suffer from the same problems of input distortion as those with end-organ disorders (i.e., a sensorineural hearing loss). More recently, Carlin & Browning (1990) reported that individuals with a conductive hearing impairment derived significantly greater benefit (as measured by aided compared with unaided free-field audio and audio-visual tests in noise) from a hearing aid than those with a comparable sensorineural impairment. However, contrary to previously held opinion, individuals with a conductive impairment are as badly if not more disabled when unaided as those with an audiometrically similar sensorineural impairment.

According to Stephens (1977), the length of time after hearing aid fitting is a factor that has been ignored by most authors. Pedersen, Frankner, & Terkildsen (1974), found that the hearing aid use of 62 subjects assessed 3 months and 7 years after the issue of their aid increased significantly rather than falling off as they had expected. More recently, Upfold and Wilson (1983) found that the older an aid was the less likely it was to be used, and that aids were significantly ($p<0.05$) more likely to be used in the initial post fitting period (i.e., first 6 months) than they were 5 years after issue.

Brooks (1981), who examined the relationship between hearing aid use and living situation, found that regardless of whether a subject lived alone, with a spouse, family, or another relative, the extent of aid use did not vary significantly. Hickson et al. (1986) also discovered a non-significant difference ($p>0.05$) in aid usage between clients who lived alone as opposed to those who lived with family or were nursing home residents.

All the above variables, apart from "type of hearing loss" (as over 90% had a sensorineural loss), were examined in the present survey in relation to hearing aid use. In addition, the impact of tinnitus on use was also considered. Most researchers appear not to have considered this variable and the literature focuses on an aid's ability to relieve the symptoms of tinnitus (e.g. Coles, 1984, 1985; Melin, Scott, Lindberg, & Lyttkens, 1987; Miller, 1981; Surr, Montgomery, & Mueller, 1985; Turner, 1982) rather than on tinnitus possibly affecting aid usage. However, an aid's ability to relieve tinnitus symptoms was also examined as a part of the survey.

As well as evaluating the effectiveness of the Clinic's delivery system, the role that the Hearing Association plays in hearing aid rehabilitation, and the factors impacting on hearing aid use, an assessment of hearing handicap was used to discover some of the problems associated with hearing loss and the extent to which these problems exist.

Finally, since Carhart's (1958) landmark article outlining the benefits of binaural amplification - an increased ability to cope with noisy situations; greater effective gain for the reception of faint sounds; and marked improvement in auditory orientation in a noisy environment - the majority of the relevant literature strongly advocated binaural fitting (e.g. Corso, 1977; Day, Browning & Gatehouse, 1988; Johnson, 1987; Markides, 1979; Mueller, 1986). Johnson (1987) suggests, however, that the educational process is not complete since the binaural fitting is still not standard

procedure. Was this the case for the Christchurch Clinic? Thus a final purpose of this survey was to discover the numbers of binaurally fitted patients and the benefits they obtained from wearing two aids.

2-2. Specific Aims of the Survey.

The specific aims of this survey were to evaluate the Christchurch Hearing Aid Clinic by:

1. Establishing the level of hearing aid use, satisfaction, performance and knowledge amongst subjects who obtained their aid from the Clinic; and

2. Discovering the extent to which customers were satisfied with the service provided by the Clinic.

In addition this survey was used to:

3. Discover the number of hearing aid owners who had heard of the Hearing Association and, if so, how?

4. Discover how many hearing aid owners had contacted the Hearing Association, their reason for making this contact, and what they thought of the service provided?

5. Determine the factors related to hearing aid use.

6. Examine, by means of the HHIE, some of the problems associated with hearing loss and the extent of these problem.

7. Discover what proportion of those issued with an aid suffered from tinnitus and to what extent wearing an aid helped to relieve this tinnitus?

8. Discover the number of binaural hearing aid wearers?

CHAPTER THREE

SURVEY METHOD.

3-1. Data Collection.

3-1-1. THE SURVEY QUESTIONNAIRE.

Following modifications made as a result of two pilot tests, a nine page questionnaire (see Appendix 2 for the complete questionnaire), derived from a combination of original and previous material (Brooks, 1989c; Pou et al., 1985; Ventry & Weinstein, 1982), emerged to address the questions outlined in chapter two, section 2-2.

Part 1.

The first of four parts began by asking for the demographic details of age, living arrangements and occupational status. Questions 1 to 8 (Brooks' 1989c - "Hearing Aid Review") probed the extent of aid usage, and both the satisfaction with, and performance of, a hearing aid.

Brooks (1989c) estimated daily use with three questions concerned with the frequency of aid use, the daily amount of use, and the amount of use made of the aid on an average day. This last measure should correlate with the level of use derived from the first two questions. If there is any discrepancy, the lower of the two values is taken as the most probable indication of daily use level.

Although the present survey asked the same three questions, hearing aid use was calculated by combining the responses to question 1 (Do you use your aid... (i) every day, (ii) most days, (iii) some days, (iv) only occasionally, (v) not at all) and question 3 (How many hours a day do you think you use it on an average day... (i) less than 2, (ii) between 2 and 4, (iii) between 4 and 8, (iv) more than 8). This combination of aid-use measures makes it possible to investigate those people, who, even though they use their aid every day, only wear it for short periods.

Brooks' (1989c) question 4, which asked whether or not family, friends, and close associates had been helpful in getting used to the aid, was not used in

the analysis of the present survey.

Question 8 measured satisfaction with the hearing aid using a 10 point scale, where at one extreme, a score of 1 represented total dissatisfaction and at the other, a score of 10 represented total satisfaction. Question 5 also assessed satisfaction by asking "Are you getting more enjoyment out of life since you obtained the hearing aid?" Question 7 expanded on the issue of satisfaction and included 17 words and expressions which the aid-owner was asked to circle if they described his or her current feelings about the hearing aid and its use.

Performance was assessed in question 6 by asking respondents to rate their aided hearing on a five-point scale for five hypothetical situations: person-to-person conversation; in a group of family or friends at home; listening to music; listening to TV or radio news; and with a group of people in noisy conditions.

Questions 9 and 10 were developed following discussions with some members of the experimental group (see chapter 4) who specifically stated that they were trying an aid in an attempt to relieve their tinnitus. Thus respondents were asked, firstly, whether he or she suffered from tinnitus, and secondly, how successful was the aid in relieving it.

Questions 11 and 12 examined whether or not the wearer was fitted with two aids (i.e., binaurally) and if so, what benefits were associated with wearing a second aid.

Part 2.

The first section of part 2 served both as confirmation of the information derived from the Clinic's files, and in some cases, as the only source of information in relation to the type of aid, the year it was received, the ear(s) fitted, and the approximate cost of the aid.

Part two questions 1-6 examined aid owners' satisfaction with clinic services and costs. Originating from Pou et al's (1981) questionnaire, questions 1 and 2 asked subjects if their hearing problem was adequately explained to them prior to being fitted with an aid, and whether or not they felt that the counselling received during their hearing aid fitting adequately prepared them for satisfactory use with their aid.

Question 3, which asked when their hearing was last tested, was included for the purpose of checking the data obtained from the Clinic files. In question 4, subjects were asked if their aid had ever been sent for repairs and, if it had, how often and how long did they have to wait for it to be returned.

Subjects were asked whether or not they considered the cost of their aid as appropriate in Question 5, and Question 6 asked if they thought the service provided by the Hearing Aid Clinic was adequate and, if it was unsatisfactory, what exactly was wrong and how could it be improved. Interestingly, pilot testing revealed that it was necessary to include the location of the Clinic.

Questions 7, 8 and 9 focused on the aid owner's knowledge of, and satisfaction with, the Hearing Association and the extent to which people issued with an aid from the Clinic were aware of this organisation.

Part 3.

To discover problems associated with hearing loss and their extent, the third part of the questionnaire consisted of "The Hearing Handicap Inventory for the Elderly" (HHIE). The HHIE comprises an emotional and social-situational subscale. The emotional subscale explores the attitudinal and emotional consequences of hearing impairment. The emotions sampled are those reportedly experienced by the vast majority of elderly people with hearing problems (Weinstein, 1984). The social-situational subscale assesses the difficulty experienced in a variety of situations and whether the hearing impairment affects behaviour, e.g., restricts social involvement. Thus, one item reads: "Does a hearing problem cause difficulty when listening to TV or radio?" While a companion item reads: "Does a hearing problem cause you to listen to TV or radio less often than you would like?" The former item identifies a situational problem, while the latter determines if the hearing problem affects behaviour.

The 25 item inventory (13 emotional response and 12 social-situational items), has a straightforward response format intended for elderly people. The respondent is asked to indicate "yes," "sometimes," or "no" to each item. The scoring system is also simple; 4 points are awarded to a "yes" response, 2 points to a "sometimes," and 0 points to a "no" response or "not applicable". The maximum score is 100 and the minimum score is 0. The higher the score, the more handicapped the respondent. Scores can be

divided into three gross categories of handicap: 0 to 16 equals no handicap, 18 to 42 mild-to-moderate handicap, and a score of 44 or higher is considered a significant handicap (Weinstein, 1984).

Pilot testing revealed that asking subjects to "Answer Yes, Sometimes or No for each question" was time consuming and a little confusing. Thus "Yes", "Sometimes" and "No" were written after each question and the instructions were changed to read, "Circle Yes, Sometimes or No for each question".

Part 4.

The fourth and final part of the survey included eight questions developed by me to assess the level of hearing aid knowledge. The maximum score for those with a BTE aid was ten. (See Table 2 for a scoring system summary.) For ITE aid owners, questions 1, 5, 6 and 7, which examined the material used to clean an ear mould and the purpose of the "M", "T" and "O" switching, did not apply and a score of five represented the maximum possible in these cases. Questions 5, 6, and 7 also did not apply to those with a BTE aid that did not display the letters "M", "T", and "O". Their maximum score was six. Because of the presence of three different groups, percentage correct was used as the measure of hearing aid knowledge so that comparisons could be made. Thus a score of 5 for the owner of a BTE aid with "MTO" on it was a score of 50.0%, whereas a score of 5 for an ITE owner meant 100.0% and a score of 5 for the non "MTO" BTE aid owners represented a score of 83.3%. These differences reflect the fact that ITE aids are inherently less complex to handle and maintain than their BTE counterparts.

Table 2

Hearing Aid Knowledge Questions and Scoring Based on the Type Of Aid.

Aid Type	Relevant Questions & Scoring	Total
B.T.E. (With MTO lettering)	Q.1. Solution for Cleaning Earmould (1 point) Q.2. Condition for Storing Batteries (1 point) Q.3. Knows where to obtain Batteries (1 point) Q.4. Precautions taken when aid not used (2 points) Q.5. What do Letters "O" (1 point); "M" (1/2 point); and "T" (1/2 point) stand for . Q.6. When use "M" setting (1 point) Q.7. When use "T" setting (1 point) Q.8. Does aid prevent hearing loss? (1 point)	**10**
B.T.E. (Other Lettering)	Q.1. Solution for Cleaning Earmould (1 point) Q.2. Condition for Storing Batteries (1 point) Q.3. Knows where to obtain Batteries (1 point) Q.4. Precautions taken when aid not used (2 points) Q.8. Does aid prevent hearing loss? (1 point)	**6**
I.T.E.	Q.2. Condition for Storing Batteries (1 point) Q.3. Knows where to obtain Batteries (1 point) Q.4. Precautions taken when aid not used (2 points) Q.8. Does aid prevent hearing loss? (1 point)	**5**

3-1-2. SUBJECT SELECTION & PROCEDURE.

Two hundred people who had been issued with their first hearing aid sometime between January 1986 and December 1990 were selected at random from the files of the Christchurch Hearing Aid Clinic. January 1986 was chosen as one cut-off point, because this was when the Clinic's current work practices commenced, and the December 1990 cut-off ensured that all subjects had been issued their hearing aid(s) at least six months previously. Forty subjects were selected from each of the five years.

In an attempt to ensure a reasonable return rate, the surveys were delivered personally to as many subjects as possible. From this personal contact it was discovered that 44 subjects had to be replaced: 10 were dead; 15 only wore an aid for a trial period and subsequently decided not to keep it; 12 actually received their first aid before 1986; and 7 were no longer at the address on

their file and could not be located. Two weeks after delivery, subjects who had not returned their survey were contacted by telephone and asked if they could please complete the required details. If they had not been contacted personally (in these cases the survey was left in their letterbox), then confirmation of the fact that they had been issued with their first aid within the last five years and had actually kept it was obtained. As a result, a further 3 subjects had to be replaced. Of the final 200 subjects who meet the requirements established for the purposes of this research, 89.0% (178/200) returned the survey.

Of the returned surveys, nine were not analysed - four because an inadequate proportion of the questionnaire had been completed, and five because these subjects had since obtained another aid from a private outlet and all their responses were made in relation to this hearing aid and not to the one issued by the Clinic. Data analysis was performed on the remaining 169 surveys.

3-2. Subject Characteristics.

Table 3 reveals that those who successfully completed the survey were not significantly different from the 22 non-returnees in terms of: age; the type of hearing loss (as classified by two Hearing Aid Clinic audiologists); and the type of hearing aid(s) worn. However, averaging the better-ear hearing losses at 0.5, 1, 2, and 4 kHz frequencies revealed that those who did not return the survey had a significantly greater hearing loss ($t(189)= -2.185$; $p<0.05$.) More than three-quarters of the respondents were retired, one-third lived on their own and only five were issued with two aids.

3-3. Data Analyses.

Data analysis was carried out on a Macintosh computer using "Statview SE + Graphic" software.

Table 3

Survey Subject Characteristics.

	Returnees (n=169)	Non-Returnees (n=22)
AGE. (years)	M=67.7 SD=10.6; Range 32-89	M=67.3 SD=12.3; Range 46-91
SEX.	105 (62.1%) Male 64 (37.9%) Female	18 (81.8%) Male 4 (18.2%) Female
HEARING LOSS.* **Better Ear Pure Tone Average- 0.5, 1, 2, 4kHz.**	M=38.3 dB. SD=10.3. Range 12.5 - 63.8	M=43.9 dB SD=17.6. Range 20.0 - 97.5
AID TYPE.	83 (49.1%) In-the-Ear. 86 (50.9%) Behind-the-Ear	10 (45.5%) In-the-Ear. 11 (50.0%) Behind-the-Ear 1 (4.5%) Body
CLASSIFICATION.	153 (90.5%) sensorineural 9 (5.3%) mixed 4 (2.4%) conductive	20 (90.9%) sensorineural 2 (9.1%) mixed
YEAR RECEIVED FIRST AID.	1986 N=33 (19.5%) 1987 N=35 (20.7%) 1988 N=34 (20.1%) 1989 N=29 (17.2%) 1990 N=38 (22.5%)	1986 N=3 (13.6%) 1987 N=5 (22.7%) 1988 N=5 (22.7%) 1989 N=7 (31.8%) 1990 N=2 (9.1%)
BINAURALLY FITTED.	5 (2.96%)	No Data Available
RETIRED?	133 (78.7%) Yes 36 (21.3%) No	No Data Available
LIVING CIRCUMSTANCES.	53 (31.7%) Alone 114 (68.3%) Not Alone	No Data Available

*$p<0.05$

CHAPTER FOUR

SURVEY RESULTS.

4-1. Hearing Aid Use.

4-1-1. Extent Of Aid Usage.

In Figure 2 the level of daily hearing aid use is shown. Almost 40% of the 169 respondents either did not use their aid at all, or if they did, then only occasionally. A similar number (42.1%) claimed that they used their aid either every day or on most days.

Figure 3 reveals that the majority of respondents (n=112) used their aid for less than 4 hpd and more than half of this group (n=58) used their aid for less than 2 hpd on an average day. The generally low levels of hearing aid use are made more obvious when one considers that only one person in eight used his or her aid for more than 8 hpd.

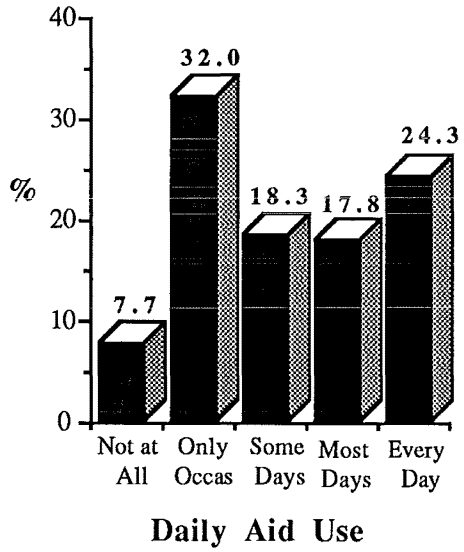


Figure 2: *Daily Hearing Aid Use.*

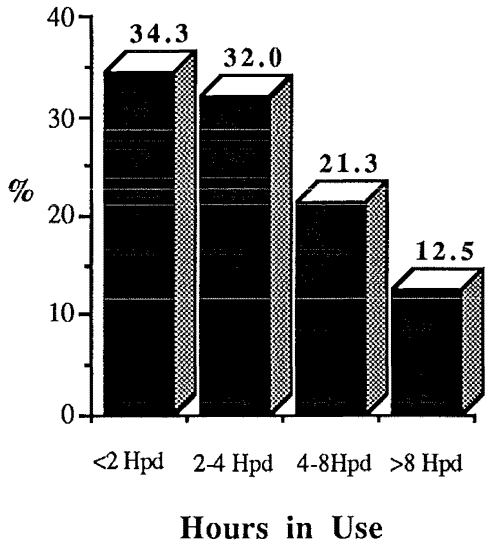


Figure 3: *Hours Hearing Aid Used On An Average Day.*

The 169 respondents were divided into three groups according to both daily aid usage and the hours worn on an average day (Table 4.) Sixty-eight "regular users" (group I) used their aids for at least 2 hpd on most days or every day. "Selective users" (group II) were the 32 subjects who wore their aid for less than 2 hpd every day or most days, at least 2 hpd on some days, and at least 4 hpd on occasional days. There were 69 "non/infrequent users" (group III) who either did not use their aid at all, or if they did, it was for less than 4 hpd on occasional days, or less than 2 hpd on some days. These groups are referred to in subsequent analyses.

Table 4

Hearing Aid Use Groups.

USE	n (%)	
Every Day & >8 hpd	19 (11.2)	**Group I ('Regular Users') n=68 (40.2%)**
Every Day & 4-8 hpd	11 (6.5)	
Every Day & 2-4 hpd	10 (5.9)	
Most Days & >8 hpd	0 (0.0)	
Most Days & 4-8 hpd	15 (8.9)	
Most Days & 2-4 hpd	13 (7.7)	
Every Day & <2 hpd	1 (0.6)	**Group II ('Selective Users') n=32 (18.9%)**
Most Days & <2 hpd	2 (1.2)	
Some Days & >8 hpd	0 (0.0)	
Some Days & 4-8 hpd	6 (3.6)	
Some Days & 2-4 hpd	17 (10.1)	
Only Occasionally & >8 hpd	2 (1.2)	
Only Occasionally & 4-8 hpd	4 (2.4)	
Some Days & <2 hpd	8 (4.7)	**Group III ('Non/Infrequent Users') n=69 (40.8%)**
Only Occasionally & 2-4 hpd	14 (8.3)	
Only Occasionally & <2 hpd	34 (20.1)	
Not At All	13 (7.7)	
TOTAL	**169 (100.0)**	

Only five (2.96%) respondents had been fitted binaurally and no one wore both aids all the time. One used both most of the time, two used them

together half the time, one occasionally wore two aids and the fifth person never used either aid. Reasons given for wearing two aids included "to balance my hearing" and "I find that reception is better".

4-1-2. FACTORS AFFECTING AID USE.

Severity of Hearing Loss.

Table 5 reveals that subjects with a greater hearing loss made significantly greater use of their aids. In particular, 46.2% of subjects with a better ear loss of 40 dB or less were non or infrequent aid users whereas only 32.3% with a loss of 40 dB or greater fitted into this category. More than half (56.9%) of those with poorer hearing (over 40dB) used their aid on a regular basis but only 29.8% of subjects with a loss of 40 dB or less were regular users.

Table 5

Hearing Aid Use Versus Severity of Hearing Loss.

	Better Ear Pure Tone Average (0.5, 1, 2, 4 kHz) dB		
Group	**≤40**	**>40**	**Total**
I	31	37	68
II	25	7	32
III	48	21	69
TOTAL	104	65	169

χ^2= 12.907; df=2; p<0.01.

Tinnitus.

Those who suffered from tinnitus for at least half the time made significantly less use of their hearing aid. Table 6 shows that the majority (56.8%) of subjects who were afflicted with this condition were infrequent or non-users (group III), whereas only 34.7% of those who did not suffer from tinnitus, or only occasionally suffered, fell into this poor use group. Eighty percent of the 68 regular users were not affected by tinnitus to any great extent.

Table 6

Hearing Aid Use Versus Tinnitus Suffering.

	Suffer From Tinnitus?		
Group	At Least Half the Time	Occasionally/ Not at all	**Total**
I	13	55	68
II	6	26	32
III	25	43	68
TOTAL	44	124	168

χ^2= 6.609; df=2; p<0.05.

4-1-3. FACTORS NOT RELATED TO USE.

Sex.

Respondents' sex was not significantly related to hearing aid use (χ^2=5.675; df=2; p>0.05.) More than two-thirds (69.2%; N=45) of the females and 42.9% (N=45) of the males were either regular or selective users and almost half (47.6%; N=50) of the males were non or infrequent users as were 29.7% (N=19) of the females.

Aid Type.

The degree of aid use did not vary significantly (χ^2=1.359; df=2; p>0.05) with the type of aid worn. Thirty-one (36.9%) BTE aid owners were regular users as were 37 (43.5%) ITE aid owners. At the other extreme, 45.2% of subjects with a BTE aid and 36.5% with an ITE aid used their aid either very occasionally or not at all.

Living Circumstances.

As elderly people who live on their own often have low communication demands placed on them and hence avoid hearing-related conflicts resulting from such things as excessive television volume and the misinterpretation of conversations, it was felt that these people would be less likely to make use

of their aid. However, whether or not subjects lived on their own did not affect the degree to which an aid was used (χ^2=1.361; df=2; p>0.05.) Sixty-six percent (n=35) of those living alone and 57% (n=65) who did not live alone were regular or selective users.

Age.

Analysis of the following age categories: 32-49 years (n=9); 50-59 years (n=31); 60-69 years (n=48); 70-79 years (n=59); ≥80 years (n=22), revealed that hearing aid use was not related to the age of the user (χ^2=10.576; df=8; p>0.05.)

Length Of Time Owned An Aid.

The number of regular, selective and non or infrequent aid users did not vary significantly (χ^2=1.798; df=8; p>0.05) with the year in which subjects received their aid (i.e., 1986; 1987; 1988; 1989; or 1990).

4-2. Satisfaction.

Subjects rated their satisfaction with an aid on a ten-point scale, such that 1 indicated total dissatisfaction and 10 complete satisfaction. The mean satisfaction rating for the 166 subjects who answered this question was 6.3 (SD=2.6; Range 1-10) with 61 (36.7%) scoring five or less.

The distributions for both regular and selective and non or infrequent users are shown in figure 4. The ratings for the regular & selective users are clearly skewed towards the higher satisfaction ratings. Eighty percent of this group rated their aid from 6 to 10. Among the non or infrequent users the distribution was much more even over the whole scale, with 62% scoring 5 or below and 38% scoring 6 and up. Overall, the regular and selective user's mean satisfaction level (M=7.2; SD=2.0) was significantly greater than that of the non or infrequent users (M=4.9; SD=2.7) (t(164)= -6.29; p<0.001.)

It is obvious that use and satisfaction are not exact correlates. For example, one selective user was totally dissatisfied with his aid, and 14 non or infrequent users (21.2%) were highly satisfied (with a score of 8 or more).

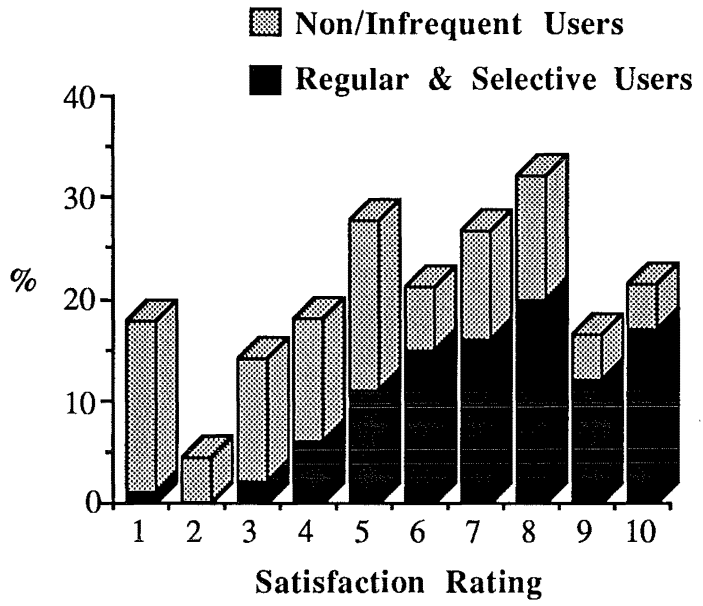


Figure 4: ***Satisfaction Rating Distribution for the Regular & Selective Aid Users Combined and the Non/Infrequent Users.***

Of the 162 respondents who answered the question, "Are you getting more enjoyment out of life since you obtained the hearing aid?" 109 (67.3%) indicated that they were and almost one third (n=53) claimed that they were not. Not surprisingly, the 109 positive respondents made significantly greater use of their aids (χ^2=28.352; df=2; p<0.001). Sixty (55.1%) of those who said "yes" were regular users and a further 20 made selective use of their aid. Only 13.2% of those who said "no" used their aid on a regular basis with an additional 22.6% selectively using their aid. For these people, even though they used their aid, life enjoyment was moderated by other variables. The majority (64.2%) of those not getting more enjoyment out of life had either stopped using their aid or had never started in the first place.

4-2-1. HEARING AID-RELATED FEELINGS.

A list of 17 possible descriptors was included in the survey, and subjects were asked to indicate which of these described their current feelings about the aid and its use. Table 7 shows the responses of the non or infrequent users and the combined responses of the regular & selective users. It is interesting that only 56.3% (N=94) described their aid as "helpful" and 28.7% (N=27) of these were non or, at best, infrequent users. In addition,

less than half of the respondents (47.3%) indicated that their aid was "easy to use" and fewer than one third (31.7%) found their aid to be "beneficial in company".

The responses of the regular and selective subjects were significantly more positive than the responses of the non or infrequent subjects in five of the first eight descriptors. In three other aspects, non or infrequent users answered significantly differently from the regular and selective users. Proportionately more claimed that their aid was "not very helpful" and "tiresome". The clearest difference, however, was with regards to noise. Only 8.0% of the regular and selective users reported noise as a problem, but 30.4% of the non or infrequent users complained of this aspect of hearing aid use. As remarked by Brooks & Bulmer (1981) it is not clear whether the difficulty with noise arises from poor and irregular use, that is, poor adaptation to the aid, or whether the low rate of usage itself results from a real and significant difficulty with noise.

Rather puzzling was the fact that two of the regular users (and two selective users) indicated that their aid was "not very helpful". This apparent inconsistency is not uncommon in the responses given by subjects to different portions of the questionnaire.

Table 7

Percentage of Regular & Selective (N=100) and Non/Infrequent (N=69) Aid Users Who Indicated From a List of Words and Expressions those Words and Expressions that Described their Current Feelings About the Aid & its Use.

Which of the following words or expressions describes your feelings NOW about the hearing aid and its use?	Percentage of Positive Responses	
	Regular & Selective Users (%)	Infrequent/Non Users (%)
Helpful [a]	67.0	39.1
Easy to use [b]	58.0	31.9
Beneficial In Company	33.0	29.0
Regret Not Obtaining Sooner [c]	22.0	8.7
Makes Less Tense [d]	18.0	5.8
Boosts Confidence	15.0	7.2
Invaluable	14.0	5.8
Indispensable [e]	12.0	2.9
Conspicuous	12.0	7.2
Uncomfortable	10.0	11.6
Noisy [f]	8.0	30.4
Tiresome [g]	6.0	17.4
Difficult To Manipulate	5.0	7.2
Difficult to Insert	4.0	11.6
Not Very Helpful [h]	4.0	15.9
Makes Feel Stupid	1.0	1.4
Unnecessary	0.0	4.3

[a] $\chi^2 = 12.847$; df=1; $p<0.001$.
[b] $\chi^2 = 11.17$; df=1; $p<0.001$.
[c] $\chi^2 = 5.228$; df=1; $p<0.05$.
[d] $\chi^2 = 5.369$; df=1; $p<0.05$.
[e] $\chi^2 = 4.451$; df=1; $p<0.05$.
[f] $\chi^2 = 14.456$; df=1; $p<0.001$.
[g] $\chi^2 = 5.567$; df=1; $p<0.05$.
[h] $\chi^2 = 7.199$; df=1; $p<0.01$.

4-3. Hearing Aid Performance.

Subjects were asked to rank five different listening situations on a five-point scale of satisfaction, ranging from very good to useless. Table 8 reveals that more than ninety percent of the respondents found communication average or better in person-to-person conversation, when listening to music, and when listening to TV or radio news. However, 42 respondents considered their aid to be either poor or useless when in a group of family or friends at home, and the majority (71.2%) rated their aid as poor or useless when with a group of people in noisy conditions.

When the scores were summed for the 139 subjects who rated their aid in all five situations (30 subjects did not provide a rating for at least one situation presumably because the aid was not used for that specific purpose) only 16 (11.5%) produced scores of 22 or more whereas almost one third (n=44) gave ratings of 14 or less. Of this second group only one person indicated full or complete satisfaction in at least one listening situation.

Table 8

Number of Respondents who Rated their Hearing Aid As Either: Useless; Poor; Average; Good Or; Very Good, In 5 Specified Situations.

Situation	Hearing Aid Rating					
	Useless	Poor	Average	Good	V. Good	Total
Person-to-Person Conversation	3	10	39	57	46	155
In Group of Family/Friends at Home	9	33	56	33	19	150
Listening to Music	1	10	52	50	36	149
Listening to TV/Radio News	4	10	40	62	39	155
With A Group In Noisy Conditions	70	41	28	11	6	156

4-4. Satisfaction with Clinic & Hearing Association Services & Costs.

Table 9 shows that most subjects (83.3%) felt that their hearing problem was adequately explained to them prior to being fitted with an aid and that the cost of their aid was appropriate.

Of the 80 people who had heard of the Hearing Association, only 17 (21.3%) indicated that the Clinic was the source of this information. The finding that a total of 148 (89.7%) people had either not heard of the Hearing Association or if they had it was from sources other than the Hearing Aid Clinic (spouse, n=3; friend, n=13; phone book, n=2; doctor, n=16; newspaper, n=7; other, n=11; do not remember, n=11), suggests that the Clinic is either not taking the time to mention to their patients that another organisation exists which may be able to help them throughout the aid acquisition process or, if this organisation was mentioned, that people have totally forgotten about it.

The reasons given by the 16 people for contacting the Hearing Association included: acting upon doctor's advice (n=2); for a hearing test (n=3); to find out more about their hearing problem (n=2); as an initial inquiry for an aid (n=1); "some gentle encouragement" (n=1); and new batteries and repair of aid (n=1).

The three people who claimed that the Hearing Association was not helpful gave the following reasons for contacting this organisation and why they thought it was not helpful: "Having trouble with the batteries - Not getting the hours of use expected. They had no idea how to help with problem of batteries" (n=1); "Just to find out what they did there. Wasn't what I was really looking for." (n=1) "To get more information. The person in charge was in a hurry to leave to attend some member at home." (n=1)

Almost one third (30.3%; n=50) of the 165 respondents indicated that their aid had been sent for repairs. Of these, 30 people had required one repair, 12 had required two repairs, and a further 2 subjects stated that their aid had been repaired on three separate occasions. (Data was missing for 6 people.) When it came to the question of how long they had to wait for their aid, seven respondents said that the repair was "immediate" and nine claimed that their aid was repaired in less than one week. However, the majority (n=24) indicated that the repair of their aid took between one week and one month and for two subjects this wait was greater than one month. The number of repairs did not vary significantly with the year in which the aid was received ($\chi^2=5.669$; df=4; $p>0.05$).

Table 9

Subject Satisfaction With the Hearing Aid Clinic, Hearing Association & Costs.

QUESTION	YES	NO	TOTAL
Was your hearing problem adequately explained to you prior to being fitted with an aid?	N=135 83.3%	N=27 16.7%	162
Do you think the cost of the hearing aid was appropriate?	N=104 73.2%	N=38 26.8%	142
Have you heard of the Hearing Association?	N=80 48.5%	N=85 51.5%	165
Have you ever personally contacted the Hearing Association?	N=16 9.7%	N=149 90.3%	165
Were they (The Hearing Association) helpful?	N=11 78.6%	N=3 21.4%	14

4-5. Hearing Aid Knowledge.

Figure 5 details the level of hearing aid knowledge. Even though it was possible for subjects to refer to various sources such as the booklet provided with their aid and the Hearing Aid Clinic (several people actually contacted them in order to answer the knowledge questions) 35.1% (n=59) scored 50% or less and 1 in 10 (10.7%) scored 30% or less. At the other extreme, 69 subjects managed to get at least 70% correct. The overall mean knowledge score was 62.7% (SD=24.3; Range 0-100) and the 84 BTE aid owner's mean score of 61.5% (SD= 22.1; Range 0-100) was similar ($t(166)=0.67$; $p>0.05$) to that of the 84 ITE aid owners (M=64.0%; SD=26.4; Range 0-100.)

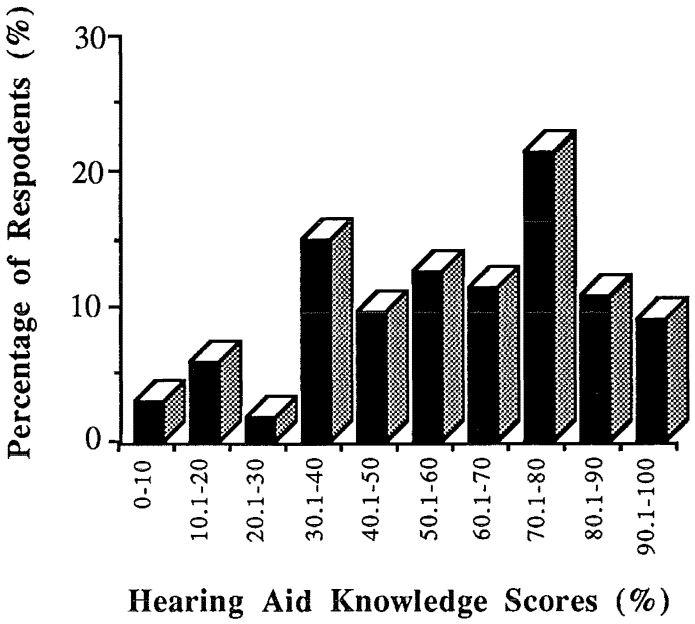


Figure 5: ***Histogram of Hearing Aid Knowledge Scores (N=168).***

Examination of the responses to individual knowledge questions revealed that almost one third of 168 subjects who completed this section of the survey (32.1%; n=54) did not know that batteries should be kept in a cool dry place. Nearly all knew of at least one outlet from which batteries could be obtained, but five did not. Of the 167 subjects who answered the question examining what precautions should be taken if an aid was not used for an extended period of time, only 56.3% indicated that the battery should be removed. For 48 respondents with a BTE aid with MTO lettering on it, 27.1% did not know that "O" represented the off position and only four (8.3%) knew that when the "T" switch on their aid was operated it switched the aid's microphone off and allowed the aid to pick up sounds by magnetic induction from loop systems and special devices available for the television and telephone.

Hearing aid use was not related to the level of hearing aid-specific knowledge ($F(2,167)=0.414$; $p>0.05$). The mean knowledge score of the regular users (M=62.0%; SD=26.3; Range 0-100) was almost identical to that of the selective (M=60.1%; SD=24.7; Range 0-100) and non or infrequent users (64.6%; SD=22.2; Range 0-100).

Finally, to examine the relationship between knowledge and satisfaction, respondent's knowledge scores were classified according to the following four categories: ≤25%; 26-50%; 51-74% and; ≥75%. Analysis of variance

revealed that the individual's knowledge of his or her hearing aid did not impact significantly on the wearer's satisfaction ($F(3,164)=1.268$; $p>0.05$).

4-6. Hearing Handicap.

Figure 6 reveals that, in spite of being issued with an aid, nearly three-quarters of the respondents still possessed a hearing handicap as measured by the HHIE. It should be stressed, however, that the use of a single measure does not capture any changes in handicap level that may have occurred as a result of obtaining an aid. The mean handicap score for the 156 subjects who completed this section was 34.2 (SD=23.1; Range 0-100). The means for the emotional subscale and social-situational subscale were 17.2 (SD=13.2; Range 0-52) and 17.0 (SD=10.7; Range 0-48) respectively.

The 41 subjects who indicated that they did not have a hearing handicap were significantly more satisfied ($F(2,150)=7.89$; $p<0.001$) with their aids (M=7.6; SD=2.5) than those with either a mild-moderate (M=6.1; SD=2.4) or significant (M=5.6; SD=2.5) handicap, but hearing aid use was not related ($F(2,155)=0.919$; $p>0.05$) to the level of hearing handicap.

Closer examination of each group's range of scores revealed that of the non or infrequent users, 24 (46.2%) had a significant handicap suggesting that a number of people, even though they possess a significant self-perceived hearing handicap, make little or no use of their hearing aid. In addition, 26.2% of the non or infrequent users did not consider themselves as having a hearing handicap. For these people, one is forced to ask what motivated them to obtained an aid in the first place. One possibility is that purchasing an aid served as a means of relieving the pressure exerted by family members. Alternatively, the fact that the aid was a free option, because either the Accident Compensation Corporation or War Pension Board paid for it, may have influenced the decision to obtain an aid in some cases.

Figure 7 shows the rating, averaged across all subjects, obtained for each question of the HHIE. Following Dillon et al. (1991), those items that reflect difficulty caused by hearing loss have been grouped on the left; those that represent avoidance of situations because of hearing loss are in the centre, and those that represent adverse emotional reactions to the effects of hearing loss are on the right.

On the whole the present aid owners did not avoid various situations because of their hearing loss, but tended to feel both "handicapped" and "left out when in a group". They also had some difficulty when it came to parties, restaurants, listening to TV and Radio and understanding a whisper.

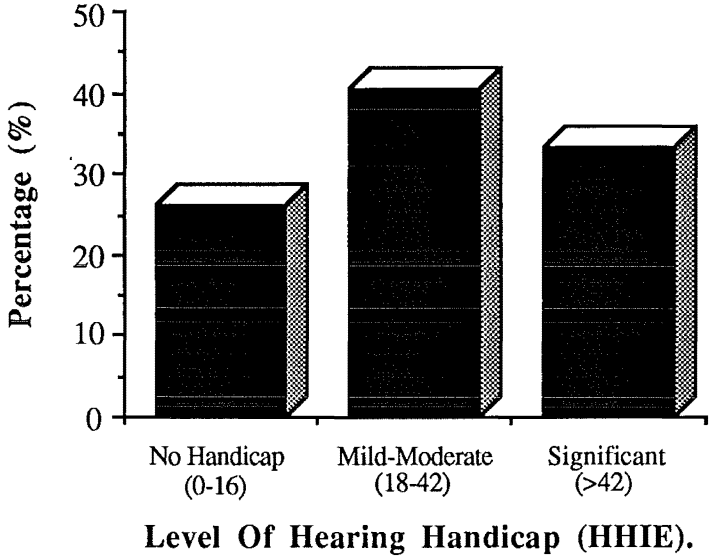


Figure 6: ***Percentage of Respondents Possessing Either No Hearing Handicap, a Mild-Moderate Handicap or a Significant Handicap.***

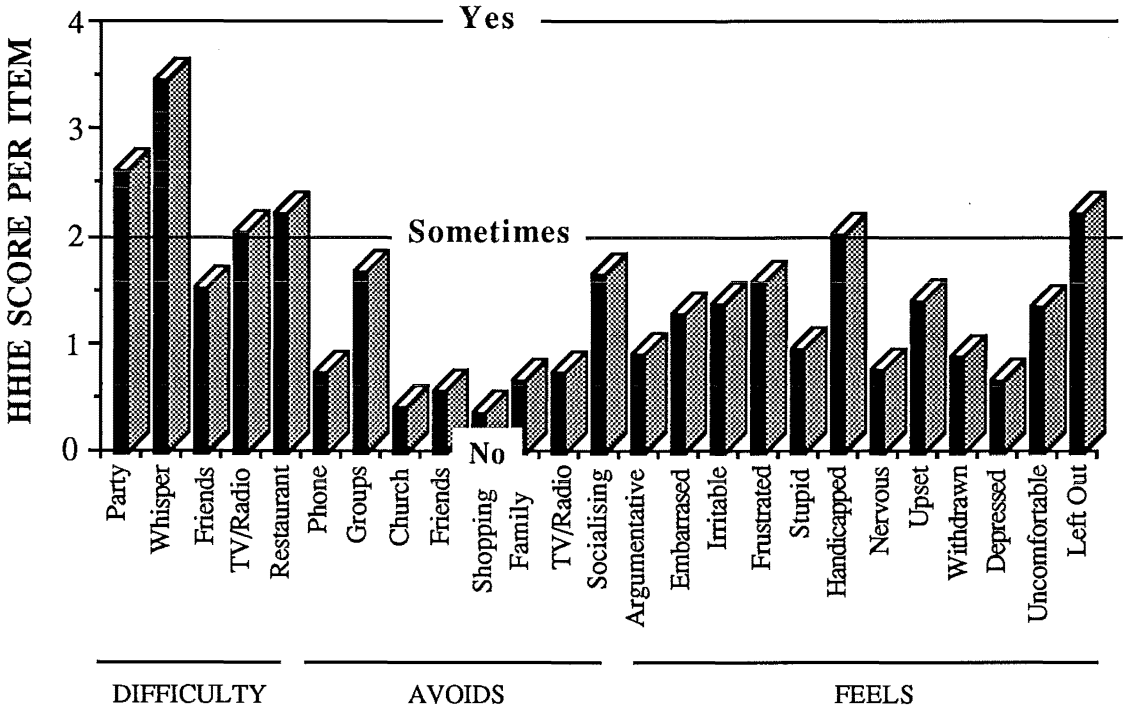


Figure 7: ***HHIE Scores for Each Questionnaire Item for the Survey Population.***

4-7. Tinnitus.

More than one quarter of those who returned the survey (26.2%; n=44) suffered from tinnitus at least half the time. The remainder were either not afflicted with tinnitus (37.3%; n=63) or if they were, it was only occasionally (36.3%; n=61).

Although hearing aids have been found to reduce tinnitus (e.g. Miller, 1981; Stacey, 1980; Turner, 1982), for 36.8% of tinnitus sufferers this was not the case. On a more positive note, 38.2% of this group indicated that wearing an aid helped for half the time or more and a further 25% said an aid helped occasionally. Overall, however, Table 10 reveals that those who suffer from tinnitus were just as likely to get no help from wearing an aid as they were to get some relief (χ^2=3.515; df=2; p>0.05.)

The 26 subjects who indicated that wearing an aid helped to mask their tinnitus for at least half the time were significantly more satisfied with their aid (M=7.3; SD=1.8; Range 3-10) than those who only got occasional relief (M=5.2; SD=2.4; Range 1-10) or no relief (M=5.8; SD= 2.5; Range 1-10), but they were not more satisfied than the non-tinnitus sufferers (M=6.5; SD=2.5; Range 1-10) (F(3,158)=3.154; p<0.05). This finding indicates that an aid's ability to mask tinnitus is an important factor in determining a tinnitus sufferer's overall satisfaction with an aid.

Table 10

Amount of Time Subjects Suffer from Tinnitus Versus the Amount of Time a Hearing Aid Provides Relief.

	Wearing a Hearing Aid Helps to mask out my ringing/tinnitus?			
Suffer from Tinnitus?	1/2 the time or more	Occasionally	Never	**Total**
1/2 the time or more	12	10	18	40
Occasionally.	14	7	7	28
TOTAL	26	17	25	68

(χ^2=3.515; df=2; p>0.05.)

CHAPTER FIVE

SURVEY DISCUSSION.

5-1. Aid Usage and the Need for Rehabilitation.

The figures for aid usage are similar to many of those reported elsewhere where adequate fitting procedures were not employed. For example, following a review of nine British studies (Bicknell & Davis, 1968; Brooks, 1972; Carstairs, 1973; Clark, 1972; Gary & Cartwright, 1951; Grier, 1968; Kodicek & Garrad, 1954; Rice, 1966) where the National Health Services' delivery system typically involved one visit only to a clinic (albeit with advice to return if further assistance was needed), Stephens (1977) stated that,

> Perhaps the most interesting and damning reflection of the current British service is the high proportion of patients who make inadequate use of their hearing aids as reflected by the proportions of patients who use there aids never or only occasionally....In the present survey it may be seen that between 41.2% and 69.7% of patients in British studies fall within these categories. (p. 389)

Brooks (1972) for example, found that 6% of 96 survey subjects did not use their hearing aid and a total of 42.7% used them only occasionally or not at all. A second British study, (Carstairs, 1973) involving 301 subjects, who, like the current survey, received their aids over a five year period, uncovered an 11.3% (n=34) non-use rate with a further 31.0% sometimes using their aid.

Even though the Clinic does schedule one post-fitting session approximately 4 weeks after fitting, a number of people may have already given up on the aid by then and simply return it convinced that it was of little or no use. In addition, following the fitting, some new aid recipients have no further face-to-face contact with the Clinic, simply phoning in to indicate that they will keep the aid. Whether or not they are capable of correctly operating it is never established.

In sum, the performance of the Christchurch Hearing Aid Clinic when assessed by self-reported use levels that are likely to represent inflated use

rates especially when one considers that objective monitoring of use-time with either an electronic monitoring device inserted into the aid (Brooks, 1972, 1979; Haggard et al., 1981) or by measuring battery consumption (Brooks, 1981) reveals that hearing aid wearers tend to overestimate the amount of use made of the aid, appears to be in line with overseas delivery systems which did not employ adequate follow-up services. Therefore, the present survey's use data suggests that there is a need for more comprehensive rehabilitation in the provision of hearing aids in the Christchurch region.

This view is reinforced, firstly, by studies in countries where extensive rehabilitation is the 'norm' that have demonstrated consistently greater use amongst subjects, and, secondly, by studies where the status quo is supplemented with additional rehabilitation. These demonstrate significantly better use amongst subjects after a moderate amount of counselling.

Evidence of the first finding is provided in Stephens' (1977) "Survey of Surveys" which examined the extent to which hearing aids were used in relation to the studies' country of origin. The nine British studies revealed that a high proportion of patients made 'inadequate' use of their aids. However, eleven Danish hearing aid surveys showed a low proportion of patients in the two poor-use categories with figures ranging between 10 and 24%. As comprehensive rehabilitation was available in Denmark and not in Britain, it is likely that extensive rehabilitation has a marked effect on hearing aid use.

Evidence of the second finding is supplied by Brooks (1979), who found that 30 subjects who received pre- and post-issue counselling made significantly better use, assessed both subjectively and objectively, of their National Health Service body-worn hearing aids compared with 30 subjects issued with an aid in the conventional NHS manner (i.e., one visit only to the clinic). Brooks (1981) also discovered a similar discrepancy in use amongst 72 subjects fitted with a post-aural aid, 36 of whom received additional counselling. Further evidence of greater use amongst patients receiving counselling was provided by Brooks (1985), who examined use rates between 149 patients who received counselling and 288 patients who did not. The proportion of non-users in the group that received hearing aid orientation and counselling (7%) was significantly less than in the uncounselled group (15%).

Brooks (1989b), after reviewing the hearing aid use literature, concluded that:

> Use data suggest also that counselling is necessary for many, possibly all, potential hearing-aid users. Without good advice before as well as after provision of the aid, optimum results will not be achieved. The elderly, who currently form the largest group requiring amplification, are especially in need of help in achieving the right attitude to a hearing aid and obtaining the best benefit from it. (p. 40-41)

Factors Which May Influence Hearing Aid Use.

The present results reveal that no matter how aid owners are classified, according to the variables presented here there are few significant differences between regular users and others. The severity of the hearing loss, and the presence of tinnitus were the only factors that were associated with significant differences in use rates. The first of these is in line with the general conclusion that the poorer the hearing, the more the patient will use his aid (see Stephens, 1977; Upfold & Wilson, 1983). The finding that subjects who suffered from tinnitus made significantly less use of their aids indicates that people suffering from this condition are likely to need additional counselling when acquiring a hearing aid.

Sex, aid type, whether or not subjects lived on their own, age, and length of time a person had owned an aid, appear, at least for aid owners fitted at the Christchurch Hearing Aid Clinic, not to be major differentiators of likely hearing aid use.

According to Brooks (1981) the non-significant relationship between use and living circumstances may be due to the crudity of the descriptor of living circumstances. For example, some elderly subjects live with relatives who go out to work throughout the whole of the day. In effect, such patients are almost as isolated as subjects living alone. Conversely, some subjects living alone lead a very active social life.

5-2. Satisfaction and the Need for Rehabilitation.

The overall impression gained from the various assessments of satisfaction reveals that a sizeable minority were unhappy customers. As few as 55.6% considered their aid to be "helpful", even fewer (47.3%) found their aid "easy to use" and still fewer (31.4%) claimed that their aid was "beneficial in company". Almost one third (32.7%) indicated that they were not getting more enjoyment out of life since obtaining an aid. However, it is possible to argue that other significant life events, such as an illness or death, may have biased the responses to this question. A similar proportion (36.7%) scored 5 or less when it came to rating their satisfaction with the aid. In addition, the 30 subjects who claimed that the counselling they received was inadequate were significantly less satisfied with their aid than the 128 respondents who felt that the counselling they received was adequate.

Interestingly, satisfaction levels reported in the literature tend to be greater than that obtained in this survey. Brooks (1989b) for example reported that of 285 respondents assessed 4 months after issue, 198 (69%) gave scores of 8 to 10 and only 19 (7%) indicated satisfactions of 3 or below. The number expressing this low level of satisfaction was more than double (15.1%) in the present survey and only 38.0% scored 8 or more. In addition, the overall satisfaction level of just over 6 is lower than that obtained by Kapteyn (1977I) who assessed the satisfaction with fitted hearing-aids of 155 patients 6 months after prescription. Kapteyn's average score was between 7 (rather good) and 8 (good).

The relationship between satisfaction and use is in agreement with Brooks (1985) who demonstrated that those wearing a hearing aid fairly extensively are generally happy with what the aid does for them and the help they receive from it. Whether low use leads to low satisfaction or vice versa is a debatable point. Obviously, if the aid is unable to be inserted or the battery changed, then it will not be used, and the owner will more than likely be dissatisfied. However, Brooks (1985) indicates that if one has not been adequately counselled about environmental noise and the effects of amplification, immediate satisfaction is likely to be low and, in the absence of professional intervention, use will probably be minimal.

5-3. Performance and the Need for Rehabilitation.

It is clear that respondents were most satisfied with their hearing aid when they were talking to one other person, listening to music, and listening to TV or radio news, whereas, in line with other studies (Carstairs, 1973; Green & Byrne, 1972), group conversation was the worst condition. For example, more than one quarter of the respondents rated the performance of their aid as poor or useless in a group of family or friends at home and three-quarters of the respondents rated their aid in a similar fashion when with a group in noisy conditions. This last finding is not surprising as the literature (see Brooks, 1985; Plomp, 1978) has consistently indicated that the overwhelming number of complaints about the aid is in respect to background noise.

Performance, as already noted, was self-assessed on a scale where 25 indicated the highest and 5 the lowest rating. In contrast to Brooks (1990), who found that 26.2% of 61 subjects who received both pre- and post-issue counselling scored 22 and above and only 13.1% gave ratings of 14 or less, the results of the current survey revealed that 11.5% produced scores of 22 or more and 31.7% gave ratings of 14 or less. In general then, subjects were considerably less satisfied with the performance of their aid in a number of specified situations.

5-4. Satisfaction With and Awareness of Rehabilitation Services and the Need for Rehabilitation.

In spite of the finding that the majority of subjects (80.7%) felt that they had received adequate counselling, more than a third (35.5%) of these people were non or infrequent users (see Table 11). In addition, 38.5% (N=50) of subjects who scored 50% or less in their level of hearing aid-related knowledge also felt that they had received adequate counselling. Taken together, and in agreement with Sorri et al. (1984), these findings indicate that we can not rely on the opinion of the hearing-handicapped when judging the adequacy of counselling given to them.

Table 11

Level of Aid Use In Relation to Whether or Not Subjects Felt that the Counselling they had Received During their Hearing Aid Fitting had Adequately Prepared them for Satisfactory Use with their Aid.

	Counselling Adequate?		
Group	**No**	**Yes**	**Total**
I	12	51	63
II	8	23	31
III	11	56	67
TOTAL	31	130	161

χ^2=1.204; df=2; p>0.05

The fact that more than half of the subjects indicated that they had never heard of the Hearing Association, let alone visited it, supports the views expressed by the authors of The Hearing Report (1984), that, of those who are fitted with hearing aids, many are not made aware of, or do not avail themselves of, the rehabilitative services offered by the Hearing Association. This lack of awareness, combined with a reluctance of practitioners to refer, and the attitudes of hearing impaired people themselves, means that the number of hearing impaired persons receiving good hearing aid treatment and follow-up is probably a minority. Low awareness, coupled with low hearing aid use, provides a logical reason to make subjects aware of this organisation. (If of course the rehabilitation offered does in fact improve aid usage.)

Although Pou et al. (1981) reported that those who felt the costs inappropriate responded 10%-25% less favourably in satisfaction, adjustment, acceptance and found the aid less useful, a number of problems exist with the measure of cost appropriateness in this survey. Firstly, a number of people had no recollection of what the aid actually cost them in the first place, and more importantly several people did not pay for their aid (i.e., they were covered by ACC or a War Pension).

The major weakness with these direct measures is that, in some cases, client contact with the Clinic had not occurred for upwards of 5 years. The ability of a largely elderly population to assess a service that may in some cases be

described only as a vague memory is questionable.

5-5. Hearing Aid Knowledge and the Need for Rehabilitation.

The fact that more than one third of the respondents could not achieve more than 50% in what could be considered a basic knowledge test indicates knowledge of how to properly maintain and operate an aid was, at best, less than adequate. Some comments and answers to this section reinforce this view. For example, one person with MTO on her aid claimed that she not only did not need the "T" setting but also did not need the "M" setting (which represents the on position!) This person also indicated that she only used the aid when watching television (and even then it does not seem to have been turned on!) She may well have been better off with an assistive listening device designed specifically for amplifying a television's audio output. Although, at the time of issue, the Clinic and patient may not have been aware that the aid was to be used for this specific purpose, proper follow-up would have discovered this and an appropriate listening device could have been tried out.

The finding that the level of hearing aid-specific knowledge was not related to hearing aid use suggests that subjects chose not to use their aid as opposed to the possibility that they could not use their aid because they did not know how. However, as no assessment of their actual manipulation skills was possible, it is not clear whether or not their actual behaviour, such as inserting their aid, matched their level of knowledge.

5-6. Some Problems Associated With Hearing Loss.

Even though in self-report measures of disability and handicap older subjects generally under-rate their disability (Lutman, 1991), the majority of subjects, in spite of using their aid on a regular or selective basis, still possessed a hearing handicap. For many then, a hearing loss continued to affect both their social and emotional well-being.

Analysis of the responses to the individual questions of the HHIE provides some indication of the problem areas encountered by established aid wearers that should be addressed by comprehensive rehabilitation. For example, a number of respondents felt "handicapped" and tended to avoid groups and

socialising. In addition, responses to this survey revealed that a number of respondents had difficulty when in parties, restaurants and groups, with the greatest difficulty being the inability to understand a whisper. Therefore, a rehabilitation program needs to pay attention to techniques that may help overcome such difficulties including, for example, the prescription of assistive listening devices to help overcome problems associated with understanding television and radio.

5-7. Tinnitus.

Results revealed that, although one quarter of respondents suffered from tinnitus for at least half the time, the aids were rather ineffective at relieving this condition. However, an aid's ability to mask tinnitus was an important factor in determining tinnitus sufferers' overall satisfaction with an aid.

With regard to tinnitus, the findings may be somewhat limited due to the brevity of questions used to examine this area. The amount of time someone suffers from tinnitus does not necessarily capture its impact on the individual. For example, it is possible that one individual who only occasionally suffers from tinnitus is so disturbed by it that he or she is unable to do little else, whereas another individual may suffer from tinnitus all the time but barely notices it. An aid's ability to affect tinnitus, therefore, should be assessed in relation to both its duration and its impact on the individual.

5-8. Two Aids?

Less than 3% of respondents received binaural aids. Hence, in Johnson's (1987) view, the educational process is not complete. To be fair to the Clinic, however, the small percentage fitted with two aids was likely to be attributable to financial considerations, especially as most aid recipients were elderly. Although it is unlikely that the low number of binaural fittings resulted from the audiologists being unaware of the advantages associated with such fittings, new aid recipients need to be made aware of the potential benefits offered by a second aid. This may include trying out a binaural fitting as a first option instead of the current situation where new aid recipients adjust to a single aid before a second one is considered.

5-9. Why a Combined Rehabilitation Program?

Although a need for rehabilitation has been demonstrated, certain conditions hampered the introduction of more extensive counselling at the Christchurch Clinic. In particular, The Hearing Report (1984), which outlines the findings and recommendations of the Board of Health Committee on Hearing, points out that, despite their training in rehabilitative techniques, audiologists often do not have the time to put these skills into practice because of more urgent priorities and excessive waiting lists. Nor is the clinical setting within a hospital necessarily conducive to rehabilitation.

Examination of these possible restrictions suggests the advantages of employing an outside voluntary agency to perform the rehabilitation. In particular, cost is not a factor and Hearing Aid Clinic personal are free to continue with the fitting of aids while the Hearing Association tutors, who are trained in the field of hearing aid rehabilitation, are able to work in a non-clinical and relaxed environment.

In sum, using an external agency, such as the Hearing Association, helps to overcome some of the difficulties associated with providing rehabilitation. However, when designing a rehabilitation program one also has to consider the population for whom this rehabilitation is aimed at. Many people seeking auditory assistance are elderly. Thus, services must be organised to ensure they cater for a population which exhibits such age related characteristics as:

1. reduced short term memory, which means that information provided to them is unlikely to be remembered.

2. reduced ability to learn new things and acquire new information.

3. reduced manual and mental dexterity, which leads to problems in operating and using hearing aids.

4. variable motivations to rehabilitation and variable expectations of results. (Upfold & Wilson, 1980)

Thus, according to Upfold & Wilson (1980), it is essential that services be organised in such a way as to minimise these effects. A major requirement must be that the amount of time and frequency of contact between service provider and recipient is sufficient. However, practical considerations, such

as mobility and transport restrictions associated with an elderly population, suggests that it is more a case of balancing the number of sessions required against the gains achieved. In this regard, Ward (1980) suggests that as little as one hour of post-issue guidance can substantially improve use.

A problem associated with tailoring the style of rehabilitation to fit a particular type of client (albeit the most likely recipients) is that other groups may not be catered for. For example, one interesting observation highlighted in The Hearing Report (1984) was that for the *young* hearing impaired adults there is often nowhere to turn because the Hearing Association is perceived to cater mainly for the elderly.

Following the above considerations and in line with the recommendations made in "A Statement from a Hearing Association Tutor" (The Hearing Report, 1984, p. 202) that:

> In many cases there needs to be closer liaison with the Hearing Association for pre and post fitting of aids to ensure better adjustment.
>
> Generally there needs to be better coordination of the services available, working in the best interests of the individual rather than each just performing his/her particular discipline.

A combined rehabilitation program utilising the services of both the Hearing Aid Clinic and The Hearing Association was implemented and is evaluated in part two of this research.

CHAPTER SIX

EXPERIMENTAL INTRODUCTION.

6-1. Evaluation of a Combined Hearing Aid Rehabilitation Program.

Based on the survey information, it was argued in the preceding chapter that there is a need for more extensive hearing aid rehabilitation. The next section begins by examining the Hearing Association and then moves to detail the actual rehabilitation program offered by the Christchurch branch.

6-1-1. THE HEARING ASSOCIATION.

Formed in 1932, The Hearing Association (known before 1976 as the League for the Hard of Hearing), is a voluntary organisation concerned with the total welfare of hearing impaired people. Its objectives are to promote and advance the interests and general welfare of all hearing impaired persons in New Zealand by providing tuition in aural rehabilitation, by supporting research into the causes, treatment and prevention of deafness, and by promoting publicity, drawing the attention of Government agencies, professional groups and the public to the causes and the ways of preventing hearing impairment, and the means by which people suffering from impaired hearing can be helped to cope with their disability at home, in the workplace and in the community. (Adapted from The Hearing Association Constitution, 1992, pp. 1-3)

The 'Association' has approximately 6000 members spread amongst 38 branches throughout the country. Its 45 Hearing Tutors (2 of whom work in the Christchurch branch) are trained:

1. to carry out audiometry and to give advice and counselling on the professional assistance available to those with impaired hearing.

2. to assist those newly equipped with hearing aids to adjust physically and psychologically to their use.

3. to assist the hearing impaired to maximise their available hearing through speech reading, auditory training and other forms of

individual or group tuition.

4. in an appreciation of the psychological and social needs of the hearing impaired and to assist them and their families through counselling, support and advice.

5. in a knowledge of hearing aids sufficient to make normal adjustments and simple repairs or possible replacement.

6. in a knowledge of the variety of mechanical and other devices to assist the hearing impaired in the home or in the community. (Hearing Association Branch Manual, 1989, p. 27)

6-1-2. THE REHABILITATION PROGRAM.

The rehabilitation program was based on one that the senior tutor of the Christchurch Hearing Association had developed over a number of years. This was then tailored to fit the three rehabilitation sessions planned for this study (see Table 12.) In particular, a pre-orientation session was included primarily to assess, and where necessary modify, expectations. (Brooks, 1981, provides a summary of 11 major reasons for including a pre-orientation stage in the rehabilitation of new hearing aid wearers.) To encourage, reinforce and deal with any problems arising while the aid was being tried out, a "post-fitting" session was scheduled to follow the Hearing Aid Clinic's fitting of the aid. Following the decision to purchase an aid, which might or might not include another visit to the Clinic, subjects were presented with the third and final rehabilitation session. All rehabilitation sessions were held at the Hearing Association.

Pre-Orientation Session.

Following mutual introductions, the first session commenced with subjects being presented with individual audiograms. This was used to explain each individual's hearing loss and the likely problems associated with such a loss. An explanation of the anatomy and the workings of the ear then followed. Also included at this stage was an explanation of otosclerosis and otitis media (if requested).

Subject expectations were then discussed. Interestingly, the majority of

clients expected a hearing aid to give them the same listening advantages as normal hearing - such as conversing with someone without being bothered by background noise. Another common expectation was that speech generated from the television or the telephone would be clearer and easier to discriminate.

The discussion then progressed on to how to get the best use from a hearing aid. To guide and reinforce the points made at this stage, "Getting Used To An Aid" (see Appendix 3) was handed out. Subjects were then introduced to various tactics aimed at helping them cope with their hearing problem (see Appendix 3) and the differences between, and functioning of, various types of aids (Body, Behind-the-Ear, and In-the-Ear) were then explained. Subjects were encouraged to handle the various aids to familiarise themselves with their method of operation.

This session concluded with questions-and-answers about any outstanding issues.

Post-Fitting Session.

Although where possible, the eight groups that were established in the pre-orientation counselling were maintained for the second session, clashes with other commitments and delays at the Hearing Aid Clinic meant that group membership was variable throughout the rehabilitation program.

Following the introduction stage that accompanied each stage of the rehabilitation process, each subject discussed his or her initial experience with the hearing aid (see Appendix 4 for some of the comments that were recorded by the tutor at this stage) and then the fitting of the ear moulds was checked.

Each subject was then asked to demonstrate how to replace the battery in their aid and how to insert the mould or aid into the ear. As Brooks (1981) points out, one of the most vital functions at this time is to determine if the patient can correctly and easily insert the earmould into the ear. Failure to achieve this utterly basic ability will almost inevitably result in rejection of the hearing aid provided. When all members of the group were proficient at these tasks, the lettering on the aids and their associated functions were explained. Of the 31 subjects who attended the second session, 16 had BTE aids with "M", "T", and "O" on them and 1 had a BTE aid with "T," "H",

and "L". The remaining 14 subjects used unlettered ITE aids. The necessity for such an explanation was clearly illustrated following the discovery of a survey pilot-test subject who, in spite of wearing an aid on a regular basis for the past five years, had used the "T" setting for this entire period. This meant that the aid, instead of amplifying sound, was in fact acting as an ear-plug!

The session concluded with a discussion of the problems associated with the new hearing aids. Encouragement and general group support from members experiencing similar problems were prominent throughout this stage and various tactics for minimising or eliminating such problems were presented by the tutor with associated group input. As an example, the problem of wind noise was often raised by those with "Phonak" BTE aids. This was remedied by the addition of an inexpensive (N.Z. $2) wind-shield. Interestingly, the subjects appeared to be completely unaware of this simple solution, which suggests that a number of hearing aid wearers seen by the Clinic could be missing out on the benefits offered by such a device.

Post Check-Up Session.

The final rehabilitation session commenced with a check on whether or not subjects had their moulds inserted correctly. Several people were still having problems and guidance was given. The Tutor also re-checked that they remembered how to clean their aids and fit a battery, and any problems that had appeared in the last few weeks were discussed.

Subjects were then introduced to various Assistive Listening Devices (ALD's), including several different loop systems (see Appendix 5 for a complete list of ALD's), telephones and telephone accessories contained in the Hearing Association's telephone room (e.g., a portable phone amplifier and a 15 metre pull-out cord ("cord-caddy") which can be attached to the phone so it can be taken it into places, such as the garden, from which the phone ringing would not normally be heard).

Table 12

Summary of the Rehabilitation Program.

PRE-ORIENTATION COUNSELLING: (Duration 1-1.5 hrs)
- Introductions. - Explanation of anatomy/working of ear & of audiograms. - Discussion of subject's hearing aid expectations & tactics for problem situations. - Examination & Explanation of different aids. - Question & Answer
POST-FITTING COUNSELLING: (Duration 1-1.5 hrs)
- Introductions. - Discuss reactions/feelings towards hearing aid that subjects are trialing. - Check fitting of mould, ability to clean aid and re-load battery. - Explain hearing aid lettering and associated functioning. - Discuss and demonstrate tactics for problem situations.
POST CHECK-UP COUNSELLING: (Duration 1.5-2 hrs)
- Introductions. - Re-check fitting of mould, ability to clean aid and re-load battery. - Demonstration of ALD's, phones, and phone aids. - Discuss any remaining concerns.

6-2. Measures Used to Evaluate the Combined Rehabilitation Program.

Performance of the combined rehabilitation program was assessed in relation to the standard aid delivery system by comparing the respective levels of use, satisfaction and ratings of performance of subjects receiving additional rehabilitation provided by the Hearing Association (the experimental group) with those who did not (the control group).

Hypothesis 1: The level of hearing aid use, satisfaction with the aid and ratings of the aids performance will be greater for subjects who received additional rehabilitation compared with subjects who received their aid from the Hearing Aid Clinic in the traditional manner.

Although there appears little doubt that pre- and post- assessment using the HHIE is useful for demonstrating the benefit of an aid per se, this information does not help to establish the relative effectiveness of a

particular delivery system. The question of interest is therefore: Is the reduction in hearing handicap using the Hearing Aid Clinic delivery system significantly different from one supplemented by additional rehabilitation offered by the Hearing Association? It would be expected that reduction would be greater in those receiving counselling, provided of course, that such counselling was directed at improving the emotional (e.g., helping subjects to come to terms with the stigma attached to wearing an aid) and social (e.g. making significant-others aware of the difficulties associated with hearing loss and how they can minimise these difficulties) aspects associated with hearing loss.

Hypothesis 2: The reduction in hearing handicap as measured by the HHIE will be greater for subjects who received additional rehabilitation.

As well as comparing the changes in hearing handicap, relative performance can be evaluated by examining the change in hearing aid knowledge and manipulation ability. This measure, which unlike the survey, includes an assessment of a subject's aid-related behaviour, is considered to be a fundamental indicator of the success or failure of the delivery system: not knowing how to insert the aid or change the battery makes the aid completely worthless.

Brooks (1979), who used a 10 point "competence in handling" scale, reported that 30 subjects who received counselling had a mean rating of 6.6 whereas the 30 matched control counterparts', who did not receive any additional counselling above the conventional NHS one visit to the Clinic, mean rating was exactly 2 points lower. Although Brooks (1979) contends that both statistically and observationally the experimental group subjects were more capable of manipulating their hearing aids than the control group subjects, whether this difference was statistically significant is not clear. In addition, using a post only measure such as this does not allow for the possibility, albeit unlikely, that the competence in handling was different between the two groups before receiving an aid. For example, some people, as a result of having close contact with an existing aid owner, may already know about of an aid. In addition, peoples' natural ability to perform tasks, such as inserting a battery, will vary.

Finally, while there is little problem in assessing a subject's level of aid-specific knowledge and most manipulation skills, such as: inserting a battery, changing volume levels, switching between microphone and telecoil, and

connecting a Behind-the-Ear aid to its mould, before they receive their aid, it is more difficult to have them demonstrate how to actually insert an aid that is not designed to fit into their ear. To provide some estimate of this ability, subjects were asked in the pre-aid questioning to determine both the correct orientation and ear that a particular aid was designed for.

In sum, it was expected that the level of knowledge and manipulation skills would increase in relation to the pre-aid level but that the group receiving rehabilitation would attain a higher level of knowledge and manipulation skill and thus show greater improvement.

Hypothesis 3: Both groups will show a significant increase in the level of hearing aid knowledge and manipulation skills, but the increase will be greater for subjects who received additional rehabilitation.

According to Brooks (1989c), the degree of success in using a hearing aid is associated with the initial attitude to hearing impairment and hearing aids. Individuals with negative perceptions tend to fare less well with amplification than those with a positive outlook. To investigate the possibility that disuse and underuse were related to the attitude of the potential user, Brooks (1989d) had 100 counselled and 100 non-counselled subjects complete a pre-aid attitudinal questionnaire. The responses to this questionnaire were then examined in relation to the level of daily aid use assessed four months later. Not only did the data suggest that attitude was important in accepting and effectively using amplification, but also recognition and rectification of aberrant attitudes can bring about better use of hearing aids. For example, in the 32 non-counselled subjects who attributed their difficulties to the poor speech of other people, use was significantly lower than for the 63 who did not transfer the blame to others. For the 30 subjects in the counselled group who, initially, transferred the blame for their problems to the speech of others, the average daily use when assessed four months after fitting was not significantly different from that of those who recognised and accepted their hearing loss.

A necessary precursor for determining the impact of counselling on attitudes is to establish that use and pre-aid attitude are in fact related and that the counselled and non-counselled groups possess similar pre-aid attitudes towards wearing an aid. If these conditions are met, then the question of what impact rehabilitation had on modifying aberrant attitudes can be addressed.

To measure pre-aid attitudes, a 12 item questionnaire was adapted from Brooks' (1989c) 39 item Hearing Assessment Questionnaire. Time constraints dictated that a relatively brief questionnaire be used. Questions evaluating motivation, recognition, expectations, and the degree of stigma associated with wearing an aid were selected to investigate the following hypotheses:

Hypothesis 4: Hearing aid use and satisfaction will be related to pre-aid attitudes towards wearing an aid.

Hypothesis 5: Both groups will possess similar pre-aid attitudes towards wearing an aid.

Contingent upon demonstrating the above relationships, and following Brooks' (1989d) findings:

Hypothesis 6: The difference in use between experimental subjects expressing either a positive or negative pre-aid attitude will not differ significantly whereas the use levels for non-rehabilitated subjects will be significantly less amongst those who expressed negative rather than positive pre-aid attitudinal responses.

CHAPTER SEVEN

EXPERIMENTAL METHOD.

7-1. Data Collection.

7-1-1. THE QUESTIONNAIRES.

Several questionnaires (see Appendix 6) were used to address the hypotheses detailed in chapter 6, section 6-2.

Hearing Assessment Questionnaire (HAQ). (Pre-test only)

Twelve questions were adapted from Brooks' (1989c) "Hearing Assessment Questionnaire" to provide the Hearing Association tutor with a profile of each experimental subject before the aid was received; determine whether or not the control and experimental groups were similar in their attitudes; discover the relationship between pre-aid attitude and hearing aid use and satisfaction assessed six months later; and assess the rehabilitation programs' ability to modify aberrant attitudes.

The questions were designed to assess subjects' recognition and awareness of their hearing loss, motivation to wear an aid, stigma attached to wearing an aid, and hearing aid expectations. Three questions examined a subject's motivation to wear an aid. Question 1 asked whether it was their own idea, uninfluenced by anyone else, to try an aid or whether they were trying one as a result of continued pressure from family and/or friends. Subjects were asked if they were looking forward to getting an aid in question 6, and question 8 asked whether or not other people's comments had made them unhappy about getting an aid.

Because subjects could receive either an ITE or BTE aid, Brooks' (1989c) question "Do you think behind-the-ear aids are tiny and INconspicuous" was modified to read "Do you think behind-the-ear/In-the-ear aids are tiny and INconspicuous" with the idea of asking subjects to answer this question in relation to the type of aid that they were to try out. Unexpectedly, however, several subjects, who had just undergone an audiological assessment, could not answer this question because they claimed to have no idea of what their prospective aid looked like. As a result this question was excluded from data

analysis.

The Hearing Handicap Inventory For The Elderly (HHIE). (Pre- & Post- Test).

This 25 item questionnaire, which also comprised part of the survey questionnaire, was administered both before and six months after receiving an aid to assess the change in clients' perception of the effects of hearing impairment on their emotional and social adjustment. (See chapter 3, section 3-1-1, part 3 for scoring details)

Hearing Aid Knowledge and Manipulation (HAKM). (Pre- & Post- Test).

The second questionnaire, administered both before and six months after receiving an aid, was designed to assess the change in the level of hearing aid knowledge and manipulation skills. The questionnaire contained the same eight knowledge questions (maximum score =10) asked in the Survey (see chapter 3, section 3-1-1, part 4), and an additional manipulation section. The manipulation section was further divided into BTE aid manipulation (maximum score = 12) and ITE manipulation (maximum score = 8). For the BTE section, subjects using a Phonak Audinet PPCL aid were asked to replace the battery (2 points), demonstrate how to switch between microphone and telecoil (2 points), connect the aid to its mould (2 points), demonstrate the correct orientation of the mould and the correct ear that the mould was meant to fit into (4 points), and alter the volume setting on the aid (2 points). In the ITE manipulation section, where an Oticon Cite I22 aid was used, connecting the aid to a mould and switching between microphone and telecoil were not required. The scores of the manipulation section were given twice the weighting of those in the knowledge section to reflect the importance of actually being able to perform the aid-related behaviour.

Although subjects were asked all questions at both the pre- and post-interviews it seemed unreasonable and unnecessary to expect a person who had been issued with an ITE aid to need to know how to manipulate and have knowledge of a BTE aid and vice versa. Therefore those questions that did not apply to the type of aid issued were excluded from both the pre- and post- test scores. This resulted in a maximum score of 22 for those with a BTE aid as the 8 points associated with the ITE manipulation ability did not

apply. For ITE aid owners, questions 1, 5, 6 and 7 (worth 5 points in total), which examined the material used to clean an ear mould and the purpose of the "M", "T", and "O" switching, did not apply and neither did the 12 points associated with knowledge of BTE aid manipulation. Thus, a score of 13 represented the maximum possible in these cases. (See Table 13)

Table 13

Scoring for the HAKM Questionnaire.

AID TYPE	HAKM SCORING.		
	Hearing Aid Knowledge. (Max. possible score)	Hearing Aid Manipulation. (Max. possible score)	TOTAL
B.T.E	10	12	22
I.T.E	5	8	13

Hearing Aid Review (HAR). (Post-test only).

In a similar fashion to part one of the Survey, questions 1-8 of this questionnaire contained Brooks' (1989c) "Hearing Aid Review" which was used as a means of assessing aid usage, satisfaction, and performance (see chapter 3, section 3-1-1, part 1 for a detailed discussion).

Questions 9 and 10 on binaural fitting were identical to those asked in the Survey and question 11 required the experimental subjects to assess their satisfaction with the rehabilitation course on a scale from 1 to 10 where 1 represented total dissatisfaction and 10 total satisfaction.

Questions 12, 15 and 16, which asked whether or not the aid had been sent for repairs and if so, how many times and how long the waiting time was; whether their hearing problem was adequately explained prior to being fitted with an aid; and whether the service provided by the Clinic was adequate, were the same as questions 1, 4, and 6 asked in part two of the Survey.

Question 13 asked subjects for the source of their hearing aid payment and whether they felt that the cost of the aid was appropriate or too expensive. Question 14 required subjects to indicate whether they had received sufficient or insufficient instruction over the period that they obtained their aid.

7-1-2. RESEARCH PROCEDURE.

Figure 8 provides an overview of the research design used to evaluate the rehabilitation program. This design consists of three stages: Pre-hearing aid data collection, the rehabilitation program, and the post data collection stage six months after subjects had received their aid.

Pre-Hearing Aid Data Collection.

Immediately following an audiological assessment, a total of 44 patients requiring an aid for the first time were asked if they would take part in a hearing aid rehabilitation program (4 people indicated that they were unable to participate.) After outlining the requirements of the program and obtaining client consent, I asked each subject the questions contained in the HAQ, HHIE, and the HAKM. Due to other commitments, 6 experimental subjects could not be seen at the Hearing Aid Clinic immediately after their audiological examination, and an appointment was made to interview them in their homes at the earliest convenient date. In all cases this was within three days of the original appointment. This procedure was also followed for the next 40 subjects who, instead of being asked to take part in a rehabilitation program, were simply told that the research involved examining various factors related to wearing a hearing aid and that they would be asked to answer some questions both prior to receiving their aid and again six months later. On average, each interview lasted for 45 minutes.

Post-Hearing Aid Data Collection.

In order to collect the six month follow-up data, each subject was contacted and an appointment time for a home visit was made. As in the pre-data collection stage, I asked each subject the questions contained in the HHIE, and the HAKM. The additional questionnaire examining factors such as aid usage, satisfaction and performance was included in the post data collection stage. Data was collected from 28 experimental and 37 control group subjects.

A debriefing session was included with the existence and function of the Hearing Association rehabilitation program being explained to all the control group subjects, who, along with the experimental subjects, were then presented with the option of becoming a member of the association. Six

control and 19 experimental group subjects took up this offer. The amount of time required for this stage of the data collection varied from 25 minutes to 1 hour.

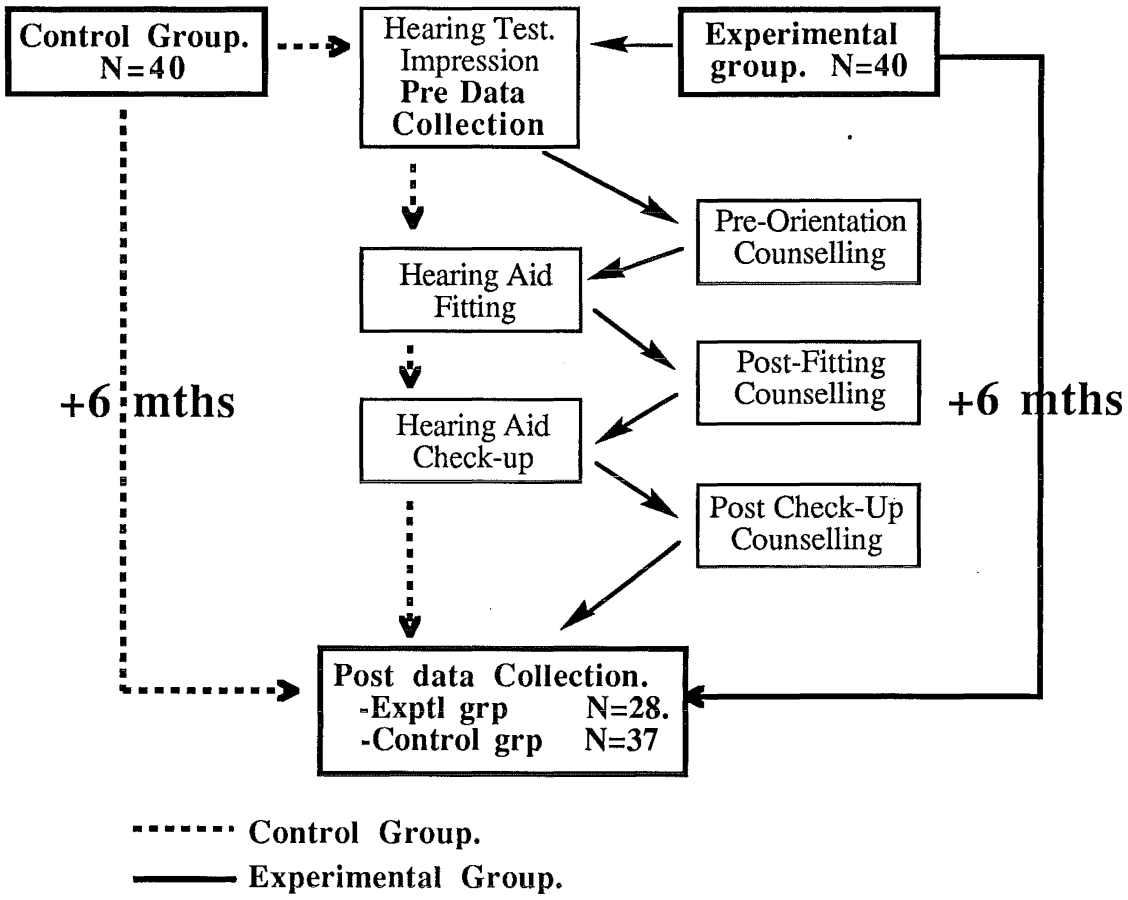


Figure 8: ***Overview of the Research Design Used to Evaluate the Hearing Aid Rehabilitation Program.***

7-2. Subjects.

7-2-1. Subject Selection.

Forty-four people seen immediately after a Public Hospital audiologist had determined that a hearing aid was required, were asked to participate in a hearing aid rehabilitation program run by The Hearing Association. As only four people indicated that they were unable to take part in this experimental group, selection biasing, where the participation of only positively motivated subjects may produce misleading results, is likely to be minimal.

The rehabilitation program was not offered to the next 40 people, who therefore acted as the control group (none of this group refused to take part). All subjects were new aid recipients.

Of the 40 experimental group subjects 5 did not attend any of the rehabilitation sessions. (Further evidence that not all experimental group subjects were positively motivated.) A further 2 died, 4 decided not to purchase an aid and post-data could not be collected from 1 subject. This left 28 subjects, 24 of whom attended all three sessions, 3 attended two sessions and the remaining individual only attended the first rehabilitation session. Pre- and post- data were collected from 37 of the control group subjects, as 3 decided not to purchase an aid. Data analysis was conducted on the 27 experimental group subjects who attended at least two rehabilitation sessions and the 37 control group subjects.

7-2-2. SUBJECT CHARACTERISTICS.

Table 14 provides a summary of both the experimental and control group subject characteristics. In spite of practical considerations making it impossible to match the two groups, t-tests revealed that the differences in age and hearing loss were not significant ($p>0.05$.) Chi-square tests also revealed that the proportions of males and females; subjects classified by an audiologist as possessing either a sensorineural (sn) or a sensorineural-mixed (sn-mixed) hearing loss; subjects issued with a BTE and ITE aid; new aid recipients living alone as opposed to living with at least one other; and subjects who were retired, were not significantly different between the two groups ($p>0.05$) However, seven weeks into the project, two audiologists set up a private practice responsible for all patients funded by either the Accident Compensation Corporation (A.C.C.) or a War Disablement Pension (W.D.P). Consequently, the control group contained significantly more subjects who paid for their aid ($\chi^2=4.104$; $df=1$; $p<0.05$) as the A.C.C and W.D.P funded patients no longer attended the Hearing Aid Clinic.

Table 14

Experimental and Control Group Subject Characteristics.

	Experimental Group. (N=27)	Control Group. (N=37)
AGE. (years)	M=65.1 SD=9.1; Range 37-80	M=68.0 SD=13.0; Range 40-96
SEX.	20 (74.1%) Males 7 (25.9%) Females	22 (59.5%) Males 15 (40.5%) Females
CLASSIFICATION.	23 (85.2%) Sensorineural 4 (14.8%) Sn-Mixed	35 (94.6%) Sensorineural 2 (5.4%) Sn-Mixed
AID TYPE.	13 (48.1%) In-The-Ear 14 (51.9%) Behind-The-Ear	23 (62.2%) In-The-Ear 13 (35.1%) Behind-The-Ear 1 (2.7%) Body
HEARING LOSS. (BETTER EAR P.T.A - 0.5, 1, 2, 4 kHz)	M=35.2 dB SD=8.8; Range 17.5- 55.0	M=40.2 dB SD=10.6; Range 20.0-68.8
LIVING CIRCUMSTANCES	4 (14.8%) Alone 23 (85.2%) Not Alone	12 (32.5%) Alone 25 (67.5%) Not Alone
RETIRED.	22 (81.5%) YES 5 (18.5%) NO	28 (75.7%) YES 7 (24.3%) NO
SOURCE OF AID PAYMENT*	13 (48.1%) Self 14 (51.9%) A.C.C/W.D.P	27 (73.0%) Self 10 (27.0%) A.C.C/W.D.P

* χ^2=4.104; df=1; p<0.05.

7-3. Timing of the Rehabilitation Program.

Figure 9, which provides an overview of the timing involved in the rehabilitation program, reveals that the average time between the pre-orientation counselling and the hearing aid fitting was 16 days (n=35, SD=8.3) ranging from 2 to 38 days.

The time delay between being fitted with the aid and the first follow-up visit was, on average, 13 days (n=31, SD=4.0).The shortest time was 6 days and the longest was 20 days. The one week absence of the tutor right in the middle of this phase served to increase the delay between fitting and follow-up.

On average, 69 days elapsed between the fitting of the aid and the second follow-up visit (n=26, SD=5.3). The shortest time was 62 days and for one subject who went on holiday the delay was 88 days. Practical constraints dictated the timing of this final session with the Hearing Association closing for three weeks during the school vacation and appointments having to be rescheduled as a result of tutor commitments during deafness awareness week.

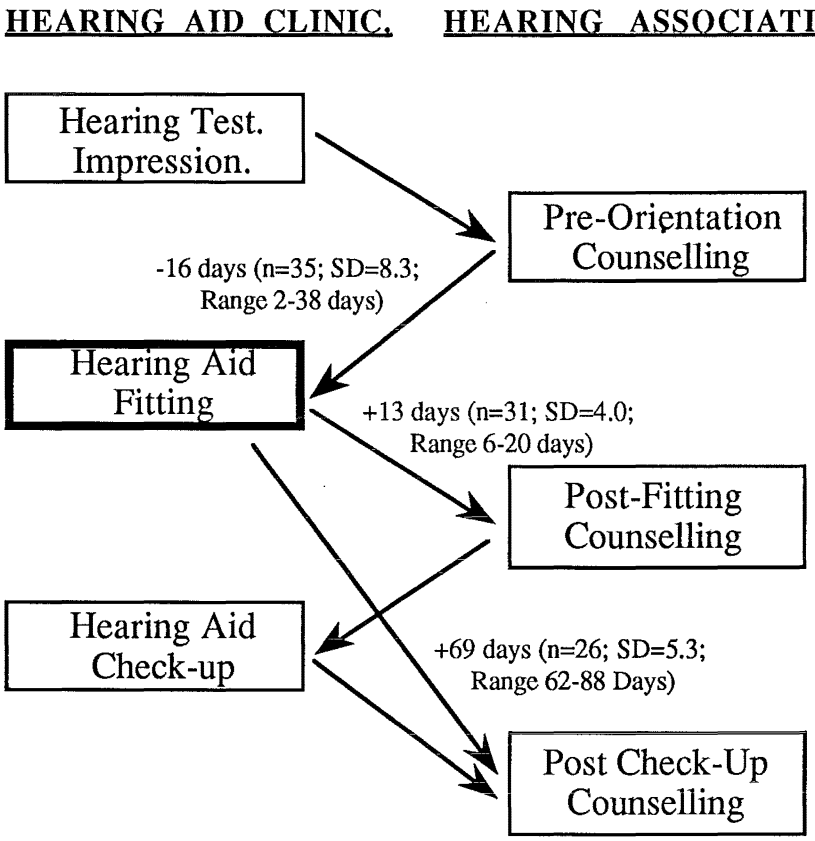


Figure 9: ***Timing of the Rehabilitation Program Based Around Hearing Aid Fitting.***

CHAPTER EIGHT

EXPERIMENTAL RESULTS.

8-1. Hearing Aid Use.

8-1-1. EXTENT OF AID USAGE.

All of the experimental group were using their aid six months after receiving it, although 4 claimed to be only occasional users. However, 1 control group subject indicated that he did not use his aid at all, and a further 15 stated that they used their aid only occasionally. More than half (n=16) of the 27 experimental subjects and 43.3% (n=16) of the control group used their aid either every day or on most days. (See Figure 10).

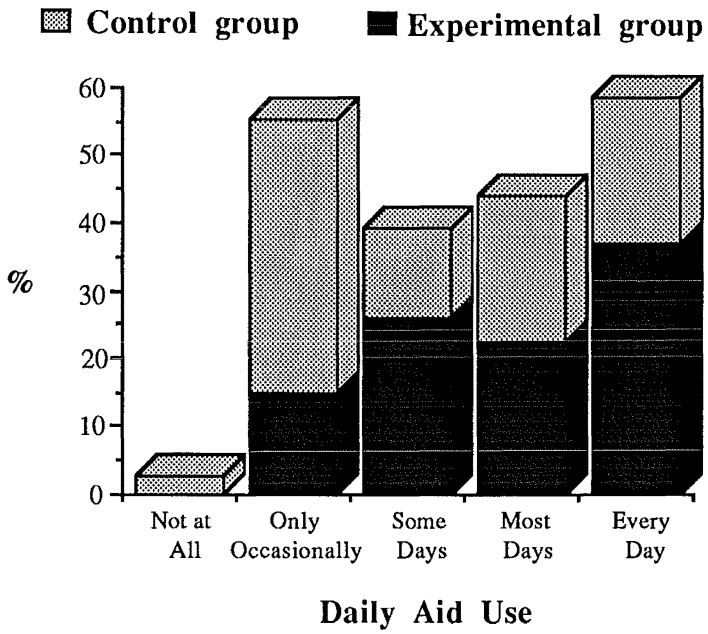


Figure 10: ***Daily Hearing Aid Use for Experimental and Control Group Subjects.***

Six experimental subjects used their aid for more than 8 hpd and another eight used them for between 4 and 8 hpd. Hence, the majority (51.8%) of the group who received the rehabilitation were using their aid for more than 4 hpd and an additional 29.6% used their aid for 2 to 4 hpd. Examination of

the control group's hours of use revealed however, that a disappointingly low 8.1% (n=3) used an aid for more than 8 hpd and only 18.9% wore an aid for between 4 and 8 hpd. Of the remainder, 43.2% (n=16) used their aid for less than 2 hpd and 29.7% (n=11) between 2 and 4 hpd. (See Figure 11.)

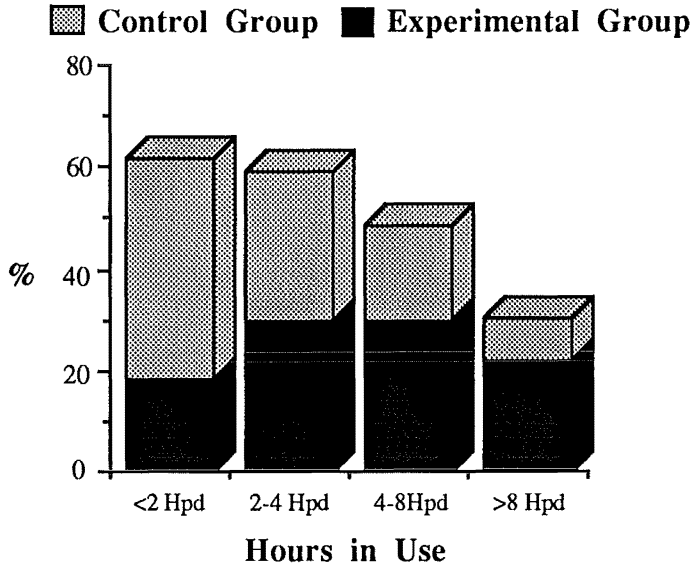


Figure 11: ***Hourly Hearing Aid Use for Experimental and Control Group Subjects.***

8-1-2. HEARING AID USE & THE EFFECT OF REHABILITATION.

As in section of the survey results, subjects were classified as either "regular", "selective" or "non or infrequent" users and a Chi-square test was employed to test if there was any significant difference in use between the control and experimental groups. Significantly greater use was observed in the subjects receiving rehabilitation than in those who did not (χ^2=6.429; df=2; p<0.05.) The percentage of regular users was 51.9 in the experimental group and 40.5 in the control group. The percentage of selective users was 33.3 for the experimental group and 16.2 for the control group. Sixteen (43.2%) of the control group were classified as infrequent or non users, whereas only four (14.8%) of the experimental group were infrequent users (see Table 15).

Table 15

Number of Experimental and Control Group Regular, Selective and Non/Infrequent Hearing Aid Users.

	Group		
Use	**Experimental**	**Control**	**Total**
I	14	15	29
II	9	6	15
III	4	16	20
Total	27	37	64

8-2. Satisfaction.

8-2-1. Satisfaction & The Effect Of Rehabilitation.

Subjects were asked to rate their general satisfaction with the hearing aid. The difference in mean satisfaction level between the control (M=7.7; SD=1.8; Range 5-10) and experimental (M=7.4; SD=1.9; Range 4-10) groups was not significant ($t(62)=0.67$; $p>0.05$.) Satisfaction was also assessed by asking subjects if they were getting more enjoyment out of life since obtaining an aid. Seventy percent of the experimental subjects and a similar 67.6% of the control group participants said that they were.

Table 16 shows the satisfaction rating relative to the amount of use made of the hearing aid. Overall, those indicating a higher level of satisfaction made significantly greater use of their aid ($\chi^2=12.458$; $df=2$; $p<0.01$.) Of the 23.4% (n=15) whose scores fell into the low satisfaction bracket, 6 were from the experimental group and 9 were control group members. The rest appeared to be satisfied with the help they obtained from the aid.

Fourteen of the 28 control group subjects (50.0%) who were satisfied with their aid (score 6-10) fell into either the non/infrequent or selective use categories as did 7 of the 21 experimental group subjects (33.3%). Some people, therefore, who used the aid for only limited periods of time were satisfied with their aid. This finding is likely to be contingent upon the aid functioning adequately in the specific condition(s) (e.g. television viewing) it was purchased for.

Table 16

Hearing Aid Use Versus Satisfaction.

	Satisfaction Level		
Use	**Low (1-5)**	**High (6-10)**	**Total**
I	1	28	29
II	5	10	15
III	9	11	20
Total	15	49	64

8-2-2. Feelings About the Aid and Its Use & The Effect Of Rehabilitation.

Table 17 highlights the number of experimental and control group subjects who indicated from a list of 17 words and expressions those words and expressions that described their current feelings about the aid and its use. Chi-square tests revealed that none of these words or expressions were chosen significantly more or less often by either group ($p>0.05$.) All of the experimental subjects found their aid easy to use as did most of the control group and no subjects indicated that the aid made them feel stupid. The fact that only one experimental group subject, as opposed to seven control subjects indicated that his aid was "difficult to manipulate" did however approach significance ($\chi^2=3.304$; $df=1$; $p=0.07$.) The finding that three subjects, who had been through the rehabilitation course, still found their aid difficult to insert could be attributed to them making limited use of their aid and therefore not practicing what was taught during the rehabilitation sessions (and not the reverse situation where a lack of knowledge causes limited use). All three indicated that they used their aid only on "some days" and one said that this was for less than 2 hpd whereas the other two used their aid for between 2 and 4 hpd.

Table 17

Percentage of Experimental and Control Group Subjects who Indicated from a List of Words and Expressions those Words and Expressions that Described their Current Feelings About the Aid and Its Use.

Which of the following words or expressions describes your feelings NOW about the hearing aid and its use?	Percentage of Positive Responses	
	Experimental Group. (%)	Control Group. (%)
Easy to use	100.0	89.2
Helpful	92.6	94.6
Beneficial In Company	70.4	56.8
Invaluable	44.4	45.9
Regret Not Obtaining Sooner	40.7	37.8
Makes Less Tense	37.0	32.4
Boosts Confidence	37.0	37.8
Indispensable	37.0	37.8
Tiresome	29.6	18.9
Noisy	25.9	40.5
Uncomfortable	18.5	24.3
Difficult to Insert	11.1	21.6
Unnecessary	11.1	10.8
Not Very Helpful	7.4	13.5
Difficult To Manipulate	3.7	18.9
Conspicuous	3.7	10.8
Makes Feel Stupid	0.0	0.0

8-3. Hearing Aid Performance.

A five point scale ranging from useless to very good was used to assess the aid's performance in five different listening situations. To score the responses, 1 point was assigned to "useless", and scoring then increased by 1 point for each increasingly positive response option so that a score of 5 was assigned to "very good". The performance score, when averaged over all five situations, was not significantly different between the two groups ($t(51)=0.91$; $p>0.05$). Twenty-three experimental subjects produced a mean rating of 19.2 (SD=3.2; Range 14-24) which was only marginally better

than 30 control groups' mean rating of 18.4 (SD=3.3; Range 10-24). t-tests also revealed that the ratings given by the experimental and control groups for each question were not significantly ($p<0.05$) different (see Table 18).

Most people (18 [66.7%] experimental and 14 [41.2%] control group) felt that the aid was "very good" in person-to-person conversation, and no one described their aid as either poor or useless under these conditions. This was not the case however when it came to rating the aid's performance in noisy conditions where eleven (40.7%) experimental and twenty-one (60.0%) control group subjects rated it as either useless or poor. Eighty-seven percent (54/62) rated their aid as average or better when in a group of family or friends at home and this percentage increased to 96.7% (58/60) when listening to TV or radio news and 98.2% (55/56) when listening to music. (Some subjects either did not or could not provide a rating for their aid in all five situations simply because the aid was not used in all situations. Thus subject numbers in each situation varied from a minimum of 56 when it came to listening to music to 62 in noisy conditions.)

Table 18

The Mean, Standard Deviation and Range of the Experimental and Control Group's Ratings of their Hearing Aid Performance In 5 Situations.

Situation	**Hearing Aid Ratings**	
	Experimental Group	Control Group
Person-to-Person Conversation.	M=4.6; SD=0.7; Range 3-5; N=27.	M=4.2; SD=0.8; Range 3-5; N=34.
In Group of Family/Friends at Home.	M=3.8; SD=0.9; Range 2-5; N=27.	M=3.5; SD=1.0; Range 2-5; N=35.
Listening to Music.	M=4.1; SD=0.8; Range 3-5; N=24.	M=4.1; SD=0.7; Range 2-5; N=32.
Listening to TV/Radio News.	M=4.1; SD=0.9; Range 2-5; N=26.	M=4.3; SD=0.8; Range 2-5; N=34.
With A Group In Noisy Conditions.	M=2.8; SD=1.0; Range 1-5; N=27.	M=2.3; SD=1.2; Range 1-5; N=35.

8-4. Satisfaction With Services & Costs.

Table 19 reveals that all of the experimental group felt that the instruction that they received over the period in which they obtained their aid was sufficient. Of interest however is the finding that over 90% of the control group also felt that their instruction, which was provided solely by the Hearing Aid Clinic, was sufficient. In addition, all of this group indicated that the service provided by the Clinic was adequate. However, nearly one third of the experimental subjects, who were in a position to assess the Clinic's performance relative to the assistance offered by the Hearing Association's rehabilitation course, did not feel that the service offered by the Clinic was adequate. Thus it would appear that until people are made aware of what comprehensive hearing aid rehabilitation can offer them, they are happy with the service they receive when acquiring an aid.

When asked to assess their satisfaction with the rehabilitation course on a scale from 1 to 10, where 1 represented total dissatisfaction and 10 total satisfaction, the experimental group indicated that they were almost totally satisfied with the rehabilitation course (M=9.1; SD=1.5; Range 3-10.) Twenty-six indicated a satisfaction level of 7 or above and one person, who had difficulty coping in a group situation and stated that he would prefer one-on-one rehabilitative assistance, only scored 3 for his level of satisfaction.

Of the 39 subjects who paid for their aid, 19 (6 experimental and 13 control) indicated that the cost was appropriate and 20 (7 experimental and 13 control) felt that their aid was too expensive. More than half (55.0%; n=11) of this "too-expensive" group were non or infrequent users. However, the level of hearing aid use did not vary significantly regardless of whether the aid was paid for by the owner, A.C.C or a War Pension (χ^2=4.284; df=4; p>0.05).

Over the six month period, seven subjects (10.9% - five experimental and two control group) had their aid repaired. This group had difficulty remembering exactly how long they had to wait for their aid to be returned from Wellington, where it was repaired. However, one subject said it was less than a week and the remainder indicated that they had to wait for between 1 week and 1 month.

Table 19

Number Of Experimental and Control Group Subjects who Indicated whether or Not they Had Received Sufficient Instruction Over the Period that they Obtained their Aid and whether or Not they thought the Service Provided By The Hearing Aid Clinic was Adequate.

	Experimental Group.				Control Group.			
	Yes	No	Can Not Say	Total	Yes	No	Can Not Say	Total
Sufficient Instruction?	**27** 100%	**0** 0%	**0** 0%	**27**	**34** 91.9%	**2** 5.4%	**1** 2.7%	**37**
Clinic Adequate?	**19** 70.4%	**8** 29.6%	---	**27**	**37** 100%	**0** 0%	---	**37**

8-5. Hearing Handicap.

Table 20 summarises the HHIE scores for the 23 experimental group and 21 control group regular and selective users prior to and following six months of hearing aid use. Before receiving an aid experimental and control group handicap scores did not vary significantly ($t(42)=0.527$; $p>0.05$), and there was a significant decrease in total hearing handicap for both the experimental ($t(22)=5.223$; $p<0.001$) and control ($t(20)=5.803$; $p<0.001$) group subjects alike.

Before receiving an aid, the emotional subscale scores of experimental and control groups also did not vary significantly ($t(42)=0.938$; $p>0.05$.) Again, after six months of hearing aid use, the emotional consequences associated with hearing impairment had decreased significantly for both experimental ($t(22)=4.81$; $p<0.001$) and control ($t(20)=4.818$; $p<0.001$) group subjects.

In addition, experimental and control group social-situational subscale scores did not vary significantly ($t(42)=0.001$; $p>0.05$) before receiving an aid. The difficulty experienced in a variety of situations, and the extent to which the hearing impairment affected behaviour, did decrease significantly for both the experimental ($t(22)=5.245$; $p<0.001$) and control ($t(20)=5.836$; $p<0.001$) groups.

8-5-1. HEARING HANDICAP & THE EFFECT OF REHABILITATION.

Although the reduction in hearing handicap was highly significant and suggests that the provision of an aid by itself is sufficient in reducing the level of handicap, the reductions in total handicap score (i.e., HHIE score on the pre-test – score on the post-test) were not significantly different between the two groups ($t(42)=0.676$; $p>0.05$.) Thus, additional counselling did not affect the reduction in hearing handicap. In a similar fashion, the difference in reductions on the emotional ($t(42)=1.118$; $p>0.05$) and social-situational ($t(42)=0.239$; $p>0.05$) subscales were not significant between the two groups.

Table 20

Pre- and Post- HHIE Scores for Experimental and Control Regular and Selective Aid Users.

GROUP	HHIE TOTAL		HHIE EMOTIONAL SUBSCALE		HHIE SOCIAL/SITUATIONAL SUBSCALE	
	PRE	POST	PRE	POST	PRE	POST
Experimental (n=23)	M=37.3 SD=23.8 Range 8-94	M=10.4 SD=7.9 Range 0-30	M=18.4 SD=14.2 Range 0-46	M=4.3 SD=4.4 Range 0-18	M=19.0 SD=11.1 Range 6-48	M=6.1 SD=4.5 Range 0-18
Control (n=21)	M=33.7 SD=21.2 Range 4-84	M=11.2 SD=8.3 Range 0-28	M=14.8 SD=10.8 Range 0-40	M=4.6 SD=4.9 Range 0-14	M=19.0 SD=11.1 Range 4-44	M=6.9 SD=4.2 Range 0-16

8-6. Hearing Aid Knowledge & Manipulation (HAKM).

Table 21 shows the mean level, standard deviation and range of hearing aid-related knowledge and manipulation skills, assessed prior to receiving an aid and again six months later, for 13 of the 14 experimental group and 11 of 13 control group subjects who were issued with a BTE aid with "MTO" lettering on them (as the 3 remaining BTE cases did not have this lettering on - the meaning of which was examined as part of their knowledge assessment - they were excluded from this analysis), and for the 13 experimental and 23 control group ITE aid owners. Of interest is the wide spread of pre-aid scores, ranging between 2 and 16 out of a possible 22

points for BTE aid owners and between 0 and 12 (maximum=13) for ITE aid owners, which supports the view that some subjects will, for one reason or another, already possess good aid manipulation skills and knowledge, which should be taken into consideration when assessing the need for, and benefits of, rehabilitation.

Not surprisingly, regardless of aid type, both groups showed highly significant increases in the level of aid specific knowledge and manipulation abilities after six months of hearing aid use. (BTE aid owners - experimental group $t(12)= -9.193$, $p<0.001$; control group $t(10)= -6.295$, $p<0.001$. ITE aid owners- experimental group $t(12)= -8.556$, $p<0.001$; control group $t(22)= -13.885$, $p<0.001$).

8-6-1. Hearing Aid Knowledge & Manipulation And The Effect of Rehabilitation.

Rather unexpectedly, the pre-hearing aid level of aid-specific knowledge and manipulation skills was significantly different between experimental and control group subjects issued with either a BTE aid ($t(22)=2.34$; $p<0.01$) or an ITE aid ($t(34)=3.282$; $p<0.01$). In particular, the experimental groups' knowledge and manipulation skills were significantly higher than those of the control group.

Due to the two groups not being equivalent to start with, an analysis of the change in knowledge and manipulation scores from the pre- to the post-condition was carried out. The changes for the BTE aid owners were not significantly different ($t(22)=1.959$; $p>0.05$), which indicates that both groups improved to a similar degree. However, the change in scores for ITE aid owners was significantly different ($t(34)= -2.537$; $p<0.05$). Surprisingly, control subjects achieved a significantly greater gain in knowledge and manipulation skills. This unexpected result is best explained by the fact that the experimental group scored relatively highly prior to receiving an aid which meant that they were left with little room for improvement, and importantly, the control group, who in spite of making a significant improvement, still possessed lower knowledge and manipulation abilities. Finally, six months after receiving an aid, experimental subjects issued with a BTE model possessed a significantly greater ($t(22)=4.05$; $p<0.001$) level of hearing aid knowledge and manipulation skills compared with their control group counterparts.

Table 21

Pre- and Post- Hearing Aid Knowledge and Manipulation Skills Scores for the Experimental and Control group Subjects Issued with either a BTE or ITE Aid.

	Issued With A BTE Aid.		Issued With An ITE Aid.	
	Experimental (N=13)	Control (N=11)	Experimental (N=13)	Control (N=23)
HAKM-pre	M=9.3 SD=4.4 Range 2-16	M=5.7 SD=2.7 Range 3-10	M=7.5 SD=2.3 Range 5-12	M=4.8 SD=2.5 Range 0-9
HAKM-post	M=19.4 SD=2.4 Range 13-21.5	M=12.7 SD=5.3 Range 3-20	M=12.6 SD=0.9 Range 10-13	M=11.9 SD=1.4 Range 8-13

It is alarming to note that amongst the control subjects, 8 (29.6%) could not replace the battery in their aid when asked to do so six months later and a further 2 who demonstrated that they could perform this essential task admitted that they had never replaced the battery since purchasing the aid. Even more surprising, was the finding that of these 10 subjects, 5 claimed to be regular users and 2 fell into the selective users categories. If these people are to be believed, then they either had someone else replace their battery for them or they wore their aid with a flat battery. The joy expressed by those who received a new battery at the post interview supports the view that many of them had continued to wear their aid even though the battery had expired.

Five of the contol subjects who could not insert a battery, were also unable to adjust the volume of their aid when inserted in the ear and one lady, who could change the battery, when asked to demonstrate how she adjusted the volume attempted to push the volume wheel towards her head at right angles to the direction it was supposed to be turned. When shown how to correctly adjust the volume she was delighted with the difference it made and admitted that the reason she had not been wearing her aid was because it seemed to make no difference. This unfortunate state of affairs was easily corrected by a few minutes of supervised practice. It is a damning indictment of the status quo when an aid is not used because the recipient does not know how to adjust its volume.

Furthermore, three of the control subjects who could not insert their battery or adjust the aids' volume while wearing the aid, were also unable to insert the aid. One of this group indicated that, as a result of a stroke, he had difficulty using his right arm. When asked if he was able to insert the aid at the Clinic when he first received his aid he said that he could not. Finally, one subject, who inserted a battery and adjusted the volume correctly, was not inserting his aid correctly. Fortunately this problem was minor and easily corrected.

In sum, almost one third of the control group (n=12; 32.4%) could not perform at least one of three fundamental tasks essential for successful aid operation. On the other hand, all of the experimental group, could adjust the volume of their aid when wearing it, although two chose to set the level of their aid prior to inserting it and one had a similar minor problem associated with inserting her aid which was also corrected. In spite of the additional rehabilitation, three experimental subjects were still unable to replace the battery (see Table 22). Two of this group were non or infrequent users indicating that they did not put into practice what was taught at the rehabilitation sessions. Finally, Chi-square analyses revealed that the number of subjects unable to either insert the aid, change the volume, or change a battery was not significantly different between the two groups.

Table 22

Percentage of Experimental and Control Group Subjects Having Difficulty In Changing the Battery, Inserting the Aid or Mould and Adjusting the Volume Control.

	Experimental (N=27)	Control (N=37)	Total (N=64)
Difficulty In Changing Battery.	0	11	6
Difficulty With Volume Control.	11	22	17
Difficulty In Inserting Aid/Mould.	4	16	11

Examination of the relationship between post-aid knowledge and manipulation and use for the BTE aid owners revealed that regular user's mean knowledge and manipulation score (M=15.6; SD=6.7; Range 3-21; n=9) was not significantly different from that of the selective (M=17.5; SD=3.4; Range 12-21.5; n=8) and non or infrequent (M=16.0; SD=5.2;

Range 6-21; n=7) users ($F(2,23)=0.299$; $p>0.05$.) This suggests that in general low use amongst BTE aid owners was due to factors other than the lack of aid knowledge or handling skills. In addition, the finding that knowledge and manipulation skills did not differ significantly between experimental and control group subjects issued with an ITE ($t(34)=1.743$; $p>0.05$), although the experimental group ITE aid owners made significantly greater use of their aids compared to their control group counterparts ($\chi^2=6.02$; $df=2$; $p<0.05$), also suggests that factors other than knowledge and manipulation abilities were responsible for the difference in use.

8-7. Hearing Aid-Related Attitudes.

Figure 12 reveals the percentage of experimental and control group subjects who responded in either a positive or negative fashion to each of the 11 pre-aid attitudinal questions. It can be seen that a similar number in both groups expected that it would take a few weeks to get used to their aid and that they would hear "quite well". Only five subjects (7.8%) felt that "others" associate wearing an aid with stupidity and for five (18.5%) experimental and nine (24.3%) control group subjects the thought of wearing an aid made them feel older. The finding that 70.3% of the experimental group compared to only 48.6% of the control group indicated that their hearing was below normal for their age represented the largest difference between groups.

If the responses that reflect a positive attitude and realistic expectations are summed for each subject to form an "attitudinal score" (maximum score=11) then a significant difference ($t(62)=2.143$; $p<0.05$) existed between the experimental (M=8.5; SD=1.4; Range 5-11) and control groups (M=7.7; SD=1.6; Range 4-10.) More precisely, the 27 experimental subjects were significantly more positive about receiving an aid than their control group counterparts.

This finding could be coincidental or the consequence of poorly motivated subjects leaving the experimental group. To test this second possibility a t-test, using the attitude scores of the original 80 subjects, was carried out. The difference in mean attitude score remained significant ($t(78)=2.506$; $p<0.05$.) Before receiving an aid, the 40 experimental group subjects had a significantly more positive attitude (M=8.5; SD=1.4; Range 5-11) than the

original 40 control group subjects (M=7.7; SD=1.6; Range 4-10.) Thus, the difference appears to be a chance occurrence, especially when one considers that only four people refused to participate in the experimental group which makes it highly unlikely that self-selection biasing produced a significantly more positive experimental group.

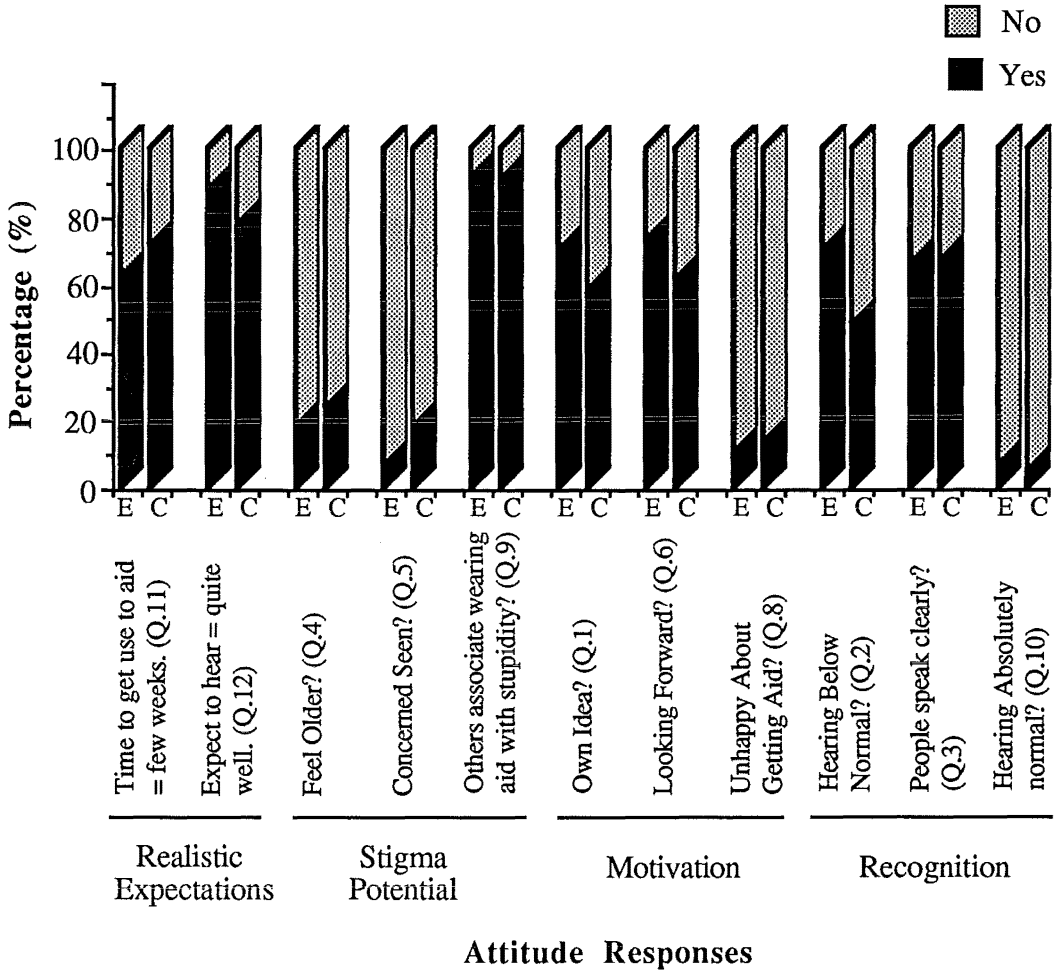


Figure 12: ***Experimental and Control Group Hearing Aid-Related Attitudes and Expectations Assessed Before Receiving their First Aid.***

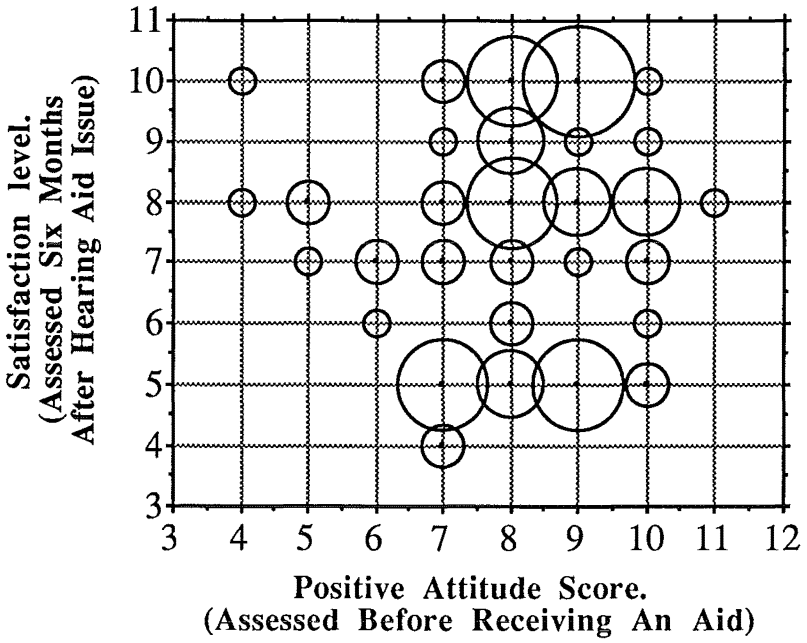
Examination of the relationship between attitude, assessed prior to receiving an aid, and the level of use six months later revealed that the mean attitude scores of all regular users (M=8.3; SD=1.5; Range 4-11), selective users (M=8.1; SD=1.6; Range 5-10) and non/infrequent users (M=7.6; SD=1.5; Range 4-10) did not vary significantly ($F(2,63)=1.501$; $p>0.05$.)

Repeating the above analysis for the two individual groups revealed that the

mean attitude scores of the experimental group's regular users (M=8.4; SD=1.7; Range 5-11), selective users (M=8.6; SD=1.0; Range 7-10) and non or infrequent users (M=8.5; SD=1.3; Range 7-10) did not vary significantly ($F(2,26)=0.022$; $p>0.05$) and the mean attitude scores of the control group's regular users (M=8.2; SD=1.4; Range 4-10), selective users (M=7.3; SD=2.1; Range 5-10) and non or infrequent users (M=7.3; SD=1.5; Range 5-10) did not vary significantly ($F(2,36)=1.453$; $p>0.05$.) Thus, regardless of the level of rehabilitation, it would appear that pre-aid attitude, as assessed by the eleven questions of the Hearing Assessment Questionnaire, was not related to hearing aid use assessed six months after aid issue.

A correlational analysis of the relationship between satisfaction with the aid and pre-aid attitude produced a correlation coefficient of only 0.025. (See Figure 13.) Thus, post-aid satisfaction and pre-aid attitude were not related. Some subjects, with the lowest pre-aid positive attitudes, scored the maximum possible for satisfaction level, whereas others, who were highly positive in their pre-aid attitudes (i.e., scored 10), only gave their aid a satisfaction rating of 5.

Repeating the above analysis, firstly for the experimental subjects, produced a correlation coefficient of 0.113. The control group, revealed a correlation coefficient of -0.064. For both groups then, the pre-aid attitude score was a poor predictor of hearing aid satisfaction assessed six months later.



Note. Increasing circle size corresponds to increasing numbers of subjects achieving the same pre-aid attitude and post-aid satisfaction scores. i.e.,

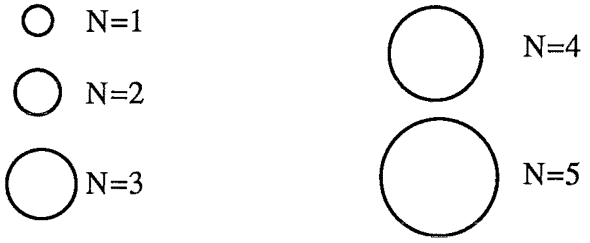


Figure 13: ***Correlational Analysis of the Relationship Between Satisfaction With the Aid Assessed Six Months After Issue and Positive Pre-Aid Attitude. (r=0.025)***

CHAPTER NINE

EXPERIMENTAL DISCUSSION.

9-1. Was the Combined Rehabilitation Program Effective?

On the key measure of relative performance, results clearly indicate significantly greater aid usage amongst subjects attending the combined rehabilitation program. However, the other measures did not capture any significant differences between the experimental and control groups. Levels of hearing aid satisfaction, ratings of aids' performance, and changes in hearing handicap levels and knowledge and manipulation skills did not vary significantly between the subjects who received their aid in the normal fashion from the Hearing Aid Clinic, and subjects who augmented this delivery system with three rehabilitation sessions at the Hearing Association.

Examination of each of the criterion measures in more detail reveals that, as in Brooks' (1989b) study, no clear differences in satisfaction emerged between the two groups. It was reassuring, however, to find that all the experimental group considered that their aid was "easy to use" and most subjects described their aid as "helpful" and "beneficial in company".

When it came to satisfaction with the services provided, the results indicated that evaluation of the Clinic's performance was contingent upon the evaluator's frame of reference. In the absence of any comparative rehabilitation services, all subjects claimed that the service provided by the Clinic was adequate, whereas almost one third of those who attended the Hearing Association felt that the Clinic was inadequate. As well as the other criticisms associated with asking subjects to directly evaluate the services on offer (see "Survey Discussion"), this data suggests that evaluation of performance may be biased in a positive direction simply because aid recipients have no idea of what effective rehabilitation is actually like.

In line with other studies (Birk-Nielsen & Ewertsen, 1974; Brooks, 1979; Malinoff & Weinstein, 1989; Mulrow et al., 1990; Newman & Weinstein, 1988; Tannahill, 1979) both groups achieved a significant reduction in hearing handicap following the provision of an aid. Of interest however, was the finding that the two groups achieved similar reductions, which suggests that the aid per se, and not the additional rehabilitation, was

responsible for this reduction. In other words, the reduction in hearing handicap did not indicate any benefit associated with receiving additional rehabilitation. A possible explanation for this unexpected finding lies in the nature of the rehabilitation offered. As the focus of the rehabilitation was on providing information and not on counselling subjects on specific emotional and social problems that the group members associated with their hearing loss, it is not surprising that a measure designed to capture such changes indicated that no differences existed between groups.

Interpretation of the non-significant differences in improvements in knowledge and manipulation skills for BTE aid owners and, contrary to expectations, the significant increase for control group ITE aid owners, and not their experimental group counterparts, was complicated by the significantly better performance of the experimental group before their receiving an aid. Although there appear to be no obvious explanations for this discrepancy, it clearly illustrates the importance of pre-testing. For example, the significantly greater post-test scores of the experimental BTE subjects suggest, in the absence of pre-testing, that the rehabilitation was responsible for this increase when in fact the difference was due to the two groups being different to start with.

It was alarming to find that almost one third of the control group subjects could not perform at least one of three handling tasks essential for successful aid operation. With this in mind, it is surprising that hearing aid use was not related to the level of knowledge and manipulation skills. When one considers that of the 10 control group subjects, who either could not, or had not, changed the battery in the aid when assessed six months after fitting, 5 claimed to be regular users and 2 fell into the selective user category, it suggests that control group subject's indications of their level of use do not match the observed ability to operate their aid. Thus, this finding supports the view that reported use figures amongst the control group subjects are likely to represent elevated actual use levels.

It was anticipated that, as a result of rehabilitation, subjects originally expressing negative attitudes would come to terms with these difficulties which would then be reflected in their greater usage and satisfaction when assessed six months later. Rather surprisingly however, the experimental subjects were more positive about receiving an aid, which may have accounted for why they made greater use. Thus one might hypothesize that the experimental group would have made greater use even if they had not

attended the rehabilitation program because, as a group, they were more positive about receiving an aid. However this argument is refuted when one considers that attitude for both groups, when assessed by the 11 item questionnaire, was not related to the levels of use and satisfaction. Thus, being more positive before receiving an aid did not indicate that the aid would be used more frequently or with greater satisfaction. Logically, however, one would expect pre-aid attitude to affect post-aid use. For example, someone who is very positive about trying an aid, indicates that it may take some time to get used but that he or she will persevere and is not bothered by its appearance and what other people think is realistically more likely to use it than someone who is trying an aid that is not really wanted, thinks that it will make him or her look stupid and expects the aid to immediately reinstate normal hearing. In addition, Brooks' (1989d) data, supporting the relationship between pre-aid attitude and post-aid use, suggests that there may be a problem with the attitudinal questionnaire used on this occasion, especially when one considers the narrow spread of scores. Eleven questions may be too few to discriminate between people. For example only one or two points separated a generally positive attitude and a somewhat negative attitude. Restricting the number of questions to meet time restrictions appears to have resulted in a similarly restricted questionnaire.

The significance of increased level of use is further enhanced, and the non-significant differences placed in perspective, when one considers that a number of factors may have elevated the control group's performance beyond that which is normal for subjects receiving an aid in the standard fashion. More precisely, control group performance may have been elevated due to the presence of the researcher both assisting this group and motivating the Clinic's staff to lift their performance. Evidence of the first possibility was provided by control group subjects who expressed gratitude for my spending some time questioning them and answering their inquiries at the pre-aid interview. Thus the control group may not accurately represent the normal delivery situation where subjects receive no additional help. Discrepancies between the control group and the survey population also support this view. As an example, 90% of the control group considered that their aid was "easy to use", even more described their aid as "helpful" and over half considered their aid to be "beneficial in company", whereas only slightly more than half of the survey respondents considered their aid as "helpful", and "easy to use" and less than one third claimed that their aid was "beneficial in company". It also seems reasonable to conclude that

experimenter presence may have motivated staff at the Clinic to lift their performance.

In short, the rehabilitation program increased the actual use of an aid. Although no other significant differences emerged, the experimental group was more positive about their aid and its use, rated their aid more positively in different situations and had greater handling skills. When one considers that the control group was assisted beyond what is normally the case for people receiving an aid from the Clinic, then the benefits of this program become more obvious.

Finally, another perspective indicating the success of the combined rehabilitation program can be taken from the audiologists who fitted the hearing aids. They commented that those who had received the pre-orientation counselling were a lot easier to work with. So much so in fact that a more permanent arrangement involving the Hearing Association conducting such pre-aid counselling, is under discussion.

9-2. Problems & Limitations Associated with the Research Strategy.

In general most of the problems associated with this research revolve around the fact that control over the actions of the Hearing Aid Clinic was not possible. For example, due to the time taken to collect 80 subjects being greater than the four weeks between having an impression taken and receiving an aid, the experimental and control groups were not matched. This resulted in the experimental group consisting of subjects, who, for some unknown reason, possessed greater aid-specific knowledge and manipulation skills, and who were significantly more positive about receiving an aid. This lack of control also resulted in two subjects, who had their hearing tested on the same day, being fitted a fortnight apart. Furthermore, as a result of one of the audiologists at the Clinic becoming ill, four subjects who had already attended the pre-orientation counselling had their appointments for hearing aid fitting postponed for four weeks. Thus, long delays between pre-orientation rehabilitation and the fitting of the aid (cf. four days - Brooks, 1981) were unavoidable in some cases.

Scheduling Hearing Association appointments also required considerable flexibility to take account of its closure during the August break, the unavailability of the tutor during deafness awareness week, and a one week

tutor absence while attending an Association conference in Dunedin. In addition, as only one tutor participated in this research and it could be argued that the program's success was attributable to the dynamics of this person and not to the program per se. Although using multiple tutors would have removed this possibility, scheduling difficulties did not permit this. There may also have been difficulties with subject's confidence if they had been confronted with different tutors in different sessions.

A possible limitation associated with the current evaluation is that the measures used did not capture some important benefits associated with attending the rehabilitation program. For example, during the six month follow-up interview, a number of spouses who had attended the rehabilitation session also expressed gratitude because it had helped them to understand their partner's situation and demonstrated techniques to minimise some of the problems that they typically encountered. A detailed qualitative analysis might be an appropriate way to supplement the measures used here. As an example of the possible insight gained by such an analysis, a portion of a letter written by one of the experimental subjects is included below,

".... I found the instruction of inestimatable value, particularly before my hearing aid was fitted. Knowing what to expect, how to overcome the initial difficulties and understanding my loss of hearing gave me a more positive attitude and better equipped me to cope. I am acquainted with two other people who have recently been fitted with hearing aids without this backup and support and I now realise how fortunate I was to have had benefit of your scheme.

I fully support this concept and again thank you."

As well as expanding on the measures used, improvements could also be made to specific questionnaires. Using Brooks' (1989c) attitudinal questionnaire instead of the abbreviated 11 item edition used here is one possibility. Improvements could also be made to the Hearing Aid Knowledge and Manipulation Questionnaire. This questionnaire was originally designed with a specific aid type in mind (i.e., BTE with MTO lettering) and as such was not ideally suited for other aid types. It may also be criticised for providing the correct answers in a multi-choice format. A better indication of knowledge levels might have been obtained using a modified questionnaire that took these considerations into account. (See Appendix 8 for a copy of the modified hearing aid knowledge questionnaire.)

9-3. Limitations Associated with the Rehabilitation Program.

The ability to remember what was taught in the rehabilitation sessions was a problem for some of the experimental subjects. It is possible, therefore, that the group design used in this rehabilitation program may have meant that certain participants did not receive the necessary practice and reinforcement required to retain what was taught. In this regard, Henrichsen et al. (1988) states

> Investigations have shown that instruction/education of the elderly hearing-impaired performed in minor groups is insufficient and irrelevant and thus instruction and auditory training should be performed on an individual basis at least when the rehabilitation is synonymous with ITE hearing aids. (p. 212)

In addition, Alpiner & McCarthy (1987) emphasise that the group should be composed of members with homogenous levels of hearing handicap. Evidence of one slow learner frustrating a group's progress in the present study also suggests that members should possess similar learning curves. However, in this case, group composition was controlled by a subjects' availability to attend a particular rehabilitation session which meant that group membership varied throughout the project. Thus, although effective group rehabilitation may rely on members being essentially similar, practical considerations made this ideal situation difficult to achieve.

Arguably, rehabilitation would have been more effective if it was tailored to fit the requirements established by the responses to the pre-aid questionnaires and was conducted on an individual rather than a group basis. However, there are advantages to the group situation: Hearing impaired clients share their problems with empathetic listeners. Clients are encouraged to work together to combat common difficulties posed by a hearing impairment. Finally, the ability to handle a large number of people in a relatively short time means that on practical grounds alone group therapy should be retained but greater attention to individual performance may be required in some cases.

9-4. Where to from Here?

In view of the above problems it is evident that a balance was struck

between an ideal situation and what practical constraints would allow. However certain improvements remain possible within the bounds of these constraints. In particular, instead of selecting people to attend a program regardless of their situation, the need for rehabilitation should be determined from subjects' attitudinal responses, levels of hearing handicap and ability to manipulate their aids. In deciding priority for rehabilitation, subjects who are motivated and realistic, who have little or no hearing handicap and can comfortably manipulate their aid should be placed at the bottom of the list.

To achieve this goal, and because of time constraints, the Clinic should have subjects complete the relevant questionnaires while waiting to see the audiologist for the first time and an assessment of handling skills needs to following the fitting of the aid. However, knowing the pre-aid attitude according to the 11 questions used in this research was of no value in terms of its ability to predict aid use and satisfaction when assessed six months later. Using all 39 questions of Brooks' (1989c) Hearing Assessment Questionnaire is suggested for future attitudinal assessments.

In addition, the HHIE is not the ideal instrument for assessing rehabilitation needs primarily because it does not directly ask the client to state their communication needs. Extensive, detailed self-assessment tools like the Hearing Performance Inventory (HPI revised version - 90 items - Lamb, Owens, & Schubert, 1983) or the Communication Profile for the Hearing Impaired (CPHI - 145 items - Demorest & Erdman, 1986) may be used to obtain such data. Alternatively, one could follow Dillon et al's (1991) lead of supplementing a reworded version of the HHIE with the initial measurement portion of Goal Attainment Scaling in which clients directly state their communication needs and their present level of functioning in each listening situation they nominate. Unfortunately, both options are time consuming and not practical for elderly patients to complete on their own while waiting to see an audiologist.

At present then, to accurately assess the need for rehabilitation takes a considerable amount of time. As a result, it may be sufficient to use just the HHIE and an assessment of handling skills as a convenient means of establishing the patients that have an obvious need for rehabilitation. (For subjects under the age of 60, the Hearing Handicap Inventory For Adults - Newman, Weinstein, Jacobson, & Hug, 1990 - which is identical to the HHIE apart from three questions which focus on the occupational effects of

hearing loss may be used).

If subjects are having handling problems or have a significant hearing handicap then an appointment to attend the Hearing Association needs to be made. The important point here is that a formal link needs to be established between the two organisations. Simply leaving Hearing Association cards with the Clinic has not proved to be an effective means of developing contact between these organisation. Hearing Association appointments need to be made by the Hearing Aid Clinic to give the association 'medical credibility' in the eyes of the patients. This credibility is necessary to guarantee regular attendances.

CHAPTER TEN

CONCLUSIONS & RECOMMENDATIONS.

10-1. Hearing Aid Survey Conclusions.

Based on the 169 respondents issued with their first aid from the Christchurch Hearing Aid Clinic after 1985, the following conclusions are offered:

1. From the user's perspective as reflected by the levels of use, satisfaction, performance and aid-specific knowledge, the Hearing Aid Clinic is not providing an effective hearing aid delivery service.

2. The majority had not heard of the Hearing Association and very few had made any contact with this organisation.

3. The level of hearing loss and the presence of tinnitus were the only factors that produced significant differences between regular users and the remainder. Use increased with increasing loss and decreased when the client suffered from tinnitus for at least half the time.

4. The majority of regular and selective users possessed a hearing handicap, indicating that their hearing loss continued to affect their social and emotional well-being. Understanding a whisper and social or group situations were key problem areas.

5. Slightly more than one quarter suffered from tinnitus for at least half the time and an aid was of little help in relieving the symptoms of tinnitus.

6. Less than 3% of the sample had been fitted binaurally.

10-2. Experimental Conclusions.

When examining the following conclusions it is important to bear in mind that the number of subjects involved was small, and the two groups were imperfectly matched.

Addressing the hypotheses detailed in chapter 6 (section 6-2), the key conclusions that can be taken from the comparison of assisted versus unassisted delivery systems are:

1. The rehabilitation offered by the Hearing Association, when interleaved with the Clinic's current fitting regime, leads to a significant increase in hearing aid use.

2. Satisfaction with the aid and ratings of the aids performance were similar for the rehabilitated and non-rehabilitated groups.

3. The reduction in hearing handicap as measured by the HHIE was similar for subjects who did or did not receive additional rehabilitation.

4. Although experimental subjects possessed greater hearing aid knowledge and manipulation skills after rehabilitation, this may be a consequence of greater ability prior to receiving an aid and not to rehabilitation per se.

5. Hearing aid use and satisfaction were not related to pre-aid attitudes towards wearing an aid as measured by a 11 item questionnaire.

6. Experimental and Control group pre-aid hearing aid-related attitudes varied significantly. The experimental group held a more positive view about obtaining an aid.

7. Because of 5 and 6 above it was not possible to determine the impact of rehabilitation on attitudes.

10-3. Recommendations.

In view of the above conclusions, it is recommended that the services of The Hearing Association be used to provide hearing aid recipients with a comprehensive follow-up service. Importantly, this frees up audiological time which in turn should help reduce the present 7 month waiting time for an audiological examination and at the same time does not require extra Hospital funding. Finally, it is suggested that Hearing Association appointments are made by the Hearing Aid Clinic to give the Association

'medical credibility' in the eyes of the patients and to ensure that, unlike the present situation, they do actually find out about this organisation.

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APPENDIX 1.

HEARING AID TYPES

HEARING AID TYPES

Hearing aids are simple in concept, however, to meet the needs of miniaturisation they may be quite complicated in design. They consist basically of three components:

1. a microphone - to pick up sounds,

2. an amplifier - to boost the volume of this sound, and

3. a speaker - to put this amplified sound into the ear of the patient.

There are five hearing aid types:

1. The *body* aid is carried in the pocket or elsewhere in one's clothing and is connected via a cord to an earphone. They have the disadvantage of being cumbersome and of picking up clothing noise, but they are very robust and for people with poor manual dexterity or poor eyesight they are easier to manage than smaller aids.

2. *Behind-the-ear* aids have their miniaturised components contained in a small capsule worn behind the ear. Amplified sound is conducted to the ear canal by a plastic tube and ear mould specially made to fit the individual.

3. The *spectacle type* where all the components are packed into one of the temple pieces (legs) of a spectacle frame. The disadvantage is that you can not hear unless you have your glasses on, and you can not see unless you are wearing your hearing aid.

4. *In-the-ear* aids where all components are carried right in the ear with only a small visible projecting part. These aids are perceived by many people as having greater cosmetic appeal and thus being socially more acceptable. However, they are only suitable for some mild to moderate hearing losses.

5. A refinement of the in-the-ear aid is the *in-the-canal* aid which fits entirely into the ear canal. These ultra-tiny aids are suitable only for mild or, at most, moderate hearing loss. Because of its size the aid is awkward to insert, adjust, or remove.

APPENDIX 2.

HEARING AID SURVEY & COVERING LETTER.

SURVEY COVERING LETTER

Dear Hearing Aid Owner,

The following survey is being conducted in order to assess how often (If at all), you wear your hearing aid and the problems your hearing loss may be causing you. Your knowledge of both your hearing aid, and the various hearing aid services is also looked at.

Please answer all the questions even if you no longer wear an aid, or only wear one very occasionally.

I appreciate that the completion of this survey may take some time (approximately 25 minutes). However, in return for your effort, it may be possible to provide you and future hearing aid wearers with a better hearing aid rehabilitation service.

When you have completed the survey, place it in the envelope provided and post it. (NO STAMP IS REQUIRED).

The information given will be kept strictly confidential.

Thank you for your co-operation.

Yours faithfully,

Neil Satherley.
Department of Psychology,
University of Canterbury.

HEARING AID SURVEY.

-CONFIDENTIAL-

Part 1

In this section, you are asked to assess your daily use, satisfaction with, and performance of your hearing aid.

Please circle the response which you believe gives an accurate indication of your CURRENT situation.

Date of birth (Please state)._____

Do you live:
(a) With your spouse and no one else
(b) With your spouse and family
(c) With relatives
(d) Alone
(e) Other (Please state) _____

Are you retired? Yes / No

If yes, what was your main occupation? _____
If no, what is your main occupation? _____

---

1. Do you use your aid.....
(i) Every day
(ii) Most days
(iii) Some days
(iv) Only occasionally
(v) Not at all

---

2. When you wear the aid, do you use it.....
(i) All day long
(ii) Most of the day
(iii) About half the day
(iv) Less than half the day
(v) Only short periods

---

3. How many hours a day do you think you use it on an **average day**.....
(i) Less than 2
(ii) Between 2 and 4
(iii) Between 4 and 8
(iv) More than 8

4. Have your family, friends and close associates been helpful to you in getting used to the aid?

(i) YES.
(ii) NO.
(iii) There is no-one to help me.

---

5. Are you getting more enjoyment out of life since you obtained the hearing aid?

(i) YES (ii) NO

---

6. In the following situations, how do you rate the hearing aid? Please circle the appropriate word.

(a) In person to person conversation..... Very Good / Good / Average / Poor / Useless
(b) In a group of family or friends at home..... Very Good / Good / Average / Poor / Useless
(c) Listening to music..... Very Good / Good / Average / Poor / Useless
(d) Listening to TV (or radio) news..... Very Good / Good / Average / Poor / Useless
(e) With a group of people in noisy conditions (i.e., club, bus, pub, etc).. Very Good / Good / Average / Poor / Useless

---

7. Please indicate - by putting a circle around them - which of the following words or expressions describes your feelings **NOW** about the hearing aid and its use: .....

DIFFICULT TO INSERT: CONSPICUOUS: HELPFUL: TIRESOME:

MAKES ME LESS TENSE: BOOSTS MY CONFIDENCE: MAKES ME FEEL STUPID

EASY TO USE: NOT VERY HELPFUL: NOISY: DIFFICULT TO MANIPULATE:

BENEFICIAL IN COMPANY: UNCOMFORTABLE: INVALUABLE:

UNNECESSARY: INDISPENSABLE: REGRET NOT OBTAINING ONE SOONER

---

8. Please try to assess your satisfaction with the hearing aid on the ten-point scale below. Circling 1 means that you are totally dissatisfied. Circling number 10 means that you are completely satisfied. Try to assess how satisfied you are:

Totally Dissatisfied	1	2	3	4	5	6	7	8	9	10	Totally Satisfied

---

9. Do you get buzzing or ringing noises inside your head or ears? (Please circle your answer).

1- all the time.
2- most of the time.
3- half the time.
4- occasionally.
5- never.

---

10. Wearing a hearing aid helps to mask out my ringing and tinnitus (headnoise). Please circle your answer.

1- all the time.
2- most of the time.
3- half the time.
4- occasionally.
5- never.
6- does not apply as I do not suffer from tinnitus.

---

11. If you have two hearing aids (one for each ear), do you wear both hearing aids ..... (Please circle your answer).

1- all the time
2- most of the time
3- half the time
4- occasionally
5- never
6- does not apply as I only have one hearing aid.

---

12. Why do you wear both aids as often as you do?

_____

_____

_____

Part 2

In this section your knowledge and appreciation of various hearing aid services are examined. Please fill in the details below.

TYPE OF AID(S) 1: In The Ear. (Fits entirely into your ear) 2: Behind The Ear. (Sits behind your ear) 3: Body aid	**YEAR RECEIVED**	**EAR** (Left, right or both)	**COST**

For the following questions, please circle your answer.

1. Was your hearing problem adequately explained to you prior to being fitted with a hearing aid? YES/NO

Comments_____

_____

_____

_____

_____

2. Do you feel the counselling you received during your hearing aid fitting adequately prepared you for satisfactory use with your aid? YES/NO

Comments_____

_____

_____

_____

_____

3. When was your hearing last tested? (Please circle your answer).

(a) less than 6 months ago (b) between 6 months & 1 year ago

(c) between 1 year & 2 years ago (d) between 2 years & 4 years ago

(e) longer than 4 years ago (f) can not remember.

4. Has your hearing aid ever been sent for repairs? YES/NO

How often?_____

How long did you have to wait?_____

Comments_____

_____

_____

_____

_____

5. Do you think the cost of the hearing aid was appropriate? YES/NO

Comments_____

_____

_____

_____

6. Do you think the service provided by the Hearing Aid Clinic (located at the St Andrews Outpatients) is adequate? YES/NO

If not, what was unsatisfactory about the service(s) provided?

_____

_____

_____

_____

How could it / they be improved?

_____

_____

_____

7. Have you heard of the Hearing Association? YES/NO
If yes, what was your source.(Please Circle).....

Spouse; Friend; Hearing Aid Clinic; Phonebook; Doctor; Newspaper; Do not remember; Other(please state)_____

8. What do you believe is the main function of the Hearing Association?

_____

_____

_____

9. Have you ever personally contacted the Hearing Association? YES/NO

If no, go to Part 3 on the next page.

If yes, was this a personal visit, or via the telephone? VISIT/PHONE

9b. For what reason did you contact the Hearing Association?

_____

_____

_____

_____

9c. Were they helpful? (Please circle your answer). YES/NO
If not, what was unsatisfactory about the service(s) provided?

_____

_____

_____

_____

_____

How could it / they be improved?

_____

_____

_____

_____

PART 3

Instructions:

The purpose of this scale is to identify the problems your hearing loss may be causing you. Circle YES, SOMETIMES, or NO for each question. Do not skip a question if you avoid a situation because of your hearing problem. If you use a hearing aid, please answer the way you hear with the aid.

Does a hearing problem cause you to use the phone less often than you would like?	YES	SOMETIMES	NO
Does a hearing problem cause you to feel embarrassed when meeting new people?	YES	SOMETIMES	NO
Does a hearing problem cause you to avoid groups of people?	YES	SOMETIMES	NO
Does a hearing problem make you irritable?	YES	SOMETIMES	NO
Does a hearing problem cause you to feel frustrated when talking to members of your family?	YES	SOMETIMES	NO
Does a hearing problem cause you difficulty when attending a party?	YES	SOMETIMES	NO
Does a hearing problem cause you to feel "stupid" or "dumb"?	YES	SOMETIMES	NO
Do you have difficulty hearing when someone speaks in a whisper?	YES	SOMETIMES	NO
Do you feel handicapped by a hearing problem?	YES	SOMETIMES	NO
Does a hearing problem cause you difficulty when visiting friends, relatives, or neighbours?	YES	SOMETIMES	NO

Does a hearing problem cause you to attend religious services less often than you would like? YES SOMETIMES NO

Does a hearing problem cause you to be nervous? YES SOMETIMES NO

Does a hearing problem cause you to visit friends, relatives, or neighbours less often than you would like? YES SOMETIMES NO

Does a hearing problem cause you to have arguments with family members? YES SOMETIMES NO

Does a hearing problem cause you difficulty when listening to TV or radio? YES SOMETIMES NO

Does a hearing problem cause you to go shopping less often than you would like? YES SOMETIMES NO

Does any problem or difficulty with your hearing upset you at all? YES SOMETIMES NO

Does a hearing problem cause you to want to be by yourself? YES SOMETIMES NO

Does a hearing problem cause you to talk to family members less often than you would like? YES SOMETIMES NO

Do you feel that any difficulty with your hearing limits or hampers your personal or social life? YES SOMETIMES NO

Does a hearing problem cause you difficulty when in a restaurant with relatives or friends? YES SOMETIMES NO

Does a hearing problem cause you to feel depressed? YES SOMETIMES NO

Does a hearing problem cause you to listen to TV or radio less often than you would like? YES SOMETIMES NO

Does a hearing problem cause you to feel uncomfortable when talking to friends? YES SOMETIMES NO

Does a hearing problem cause you to feel left out when you are with a group of people? YES SOMETIMES NO

PART 4

In this section your hearing aid knowledge is assessed. Please circle your answer.

1. To clean an ear mould, you should use a slightly damp cloth and.....

(a) water. (b) cleaning fluid. (c) alcohol. (d) solvent

(e) do not know (f) other (please state)_____

2. Hearing aid batteries should be kept in a .....

(a) hot dry place. (b) somewhere damp. (c) no where in particular.

(d) cool dry place (e) do not know. (f) other(please state)_____

3. Batteries for a hearing aid can be obtained from..... (Please circle all the places where you think that the batteries can be obtained from).

(a) most chemist shops. (b) the Hearing Aid clinic.

(c) the Hearing Association. (d) do not know.

4. When a hearing aid is not used for an extended period of time, what precautions should be taken?

_____

_____

_____

5. What do the letters "O", "M" and "T" on a hearing aid stand for?

O- _____

M- _____

T- _____

6. When should the "M" setting be used?

_____

_____

7. When should the "T" setting be used?

_____

_____

8. Does a hearing aid prevent hearing loss?
(Please circle your answer) YES / NO / DO NOT KNOW

9. How long has it been since you became aware of any hearing loss.
(Please state)_____

THE END.

-Please Check That All Questions Have Been Answered.
-Remember, *ALL* Information Given in this Survey Will Remain Confidential.

THANK YOU FOR YOUR CO-OPERATION.

APPENDIX 3.

HEARING ASSOCIATION INFORMATION SHEETS.

(A) Getting Used To An Aid.

(B) What is a Hearing Tactic Approach?

(C) Listening in a Group.

A: GETTING USED TO AN AID.

Begin with a comfortable volume level.

In the beginning keep the volume at a level which feels comfortable for your ears even if you miss a few words. As you adjust to using the side you can gradually increase the volume.

Begin with easier hearing challenges.

Treat yourself to easy listening during the first few days or weeks. Don't be dismayed if at first you cannot understand low voices or hear a conversation perfectly in a noisy room. Stand close and face the person with whom you are talking, and don't be afraid to ask people to speak more distinctly.

Don't overtire yourself.

If the aid begins to make you feel nervous or tired, turn it off or remove it. In a few weeks you probably will be able to wear it from morning till night without fatigue or nervousness.

Re-learn the trick of concentration.

Because of your hearing loss, you may have forgotten how to concentrate on the "sound environment". Make a conscious effort to pay close attention to conversation, to music, to the quality of the sounds within your new hearing range. You will soon find that you are coming closer to nature, and to the people around you.

Don't be afraid to ask to for help.

Your friends and loved ones have a stake in helping you adjust to the hearing aid. You might ask them to touch your arm or make a gesture to attract your attention before they speak to you during the first few days. Ask them to speak slowly, clearly, and distinctly in a normal conversational tone. Shouting only makes it more difficult for you to hear.

Hearing in noisy places.

You may be discouraged when you first try to follow a conversation where there is a high level of background noise. But be patient. You probably can learn to separate speech from background noise, or one voice from a number of voices around you. If you loss is severe, however, even the best of hearing aids may not help you much in a noisy room.

Hearing at church.

In a church or auditorium, sit near the front and turn up the volume on your hearing aid as mush as you can without making the background noises uncomfortably loud. You may miss some of the words the first time around, but be patient. Listening with a hearing aid is often a skill which must be acquired.

B: WHAT IS A HEARING TACTIC APPROACH?

It is a dynamic approach in coping with a hearing problem. It attempts to help a person with a hearing problem change his environment to assist his loss. It can be used when lip-reading and hearing fail. It also assists lip-reading and listening.

A CHECK LIST - ARE YOU TRYING THESE?

1. The Tactic of Position: Have you investigated trying out different positions in different rooms and situations? Sitting at the head of the dinner table may be better than at the side of the table in front of a large window with the light in your eyes!

   Yes/No

2. The Tactic of Devices: Have you investigated devices? An amplified phone could be described as a device. Are you using devices creatively?

   Yes/No

3. The Tactic of Creative Repeats: How do you ask for a repeat? "What" "You are MUMBLING!" Or have you tried, "I have missed the last part of that sentence..." "I'm interested in what you're saying, but I need to see your lips...." Are you CREATIVE?

   Yes/No

4. The Tactic of Self Responsibility: Do you take responsibility for your loss or do you blame others? - "It would be OK if others spoke clearly!" Do you collect 'uncomfortable feelings' such as guilt, confusion, inadequacy or embarrassment and think other people impose these on you - or can you shake these off? Can you laugh? Do you think you are RESPONSIBLE for the way you cope?

   Yes/No

5. The Tactic of Waiting and Stalling: Sometimes, it you wait a while, the confused jumble of a conversation becomes clear. If you always say immediately, "I beg your pardon," as soon as you cannot hear, it might mean you are demanding a lot of unnecessary repetitions. Do you wait?

   Yes/No

6. The Tactic of Useful Questions: Do you ask useful questions? "Did you say this train goes to Box Hill? is better than "Where does this train go?"

Yes/No

7. Silence and Observation: Sometimes a person can tune in to conversation by observation. About 70% of our communication is non-verbal. Becoming sensitive to non-verbal communication such as gestures is an exciting experience. Are you interested in NON-VERBAL communication?

Yes/No

8. Introducing a Topic: Sometimes you can introduce a topic into conversation to establish your own topic - have you TRIED this?

Yes/No

9. Checking Information: Check information that is checkable! Do you ask, "Was the appointment for the 1st?" Do you CHECK?

Yes/No

10. Letting it Go!: You can't hear everything! no one can! Many people, when they discover they have a loss, begin to become sensitive to the things they can't hear and often wish to hear everything - even things a person without a hearing loss can't hear! Can you LET GO?

Yes/No

11. Change!: If hobbies, committees, are becoming difficult to enjoy or to cope with, have you tired new activites that are one-to-one? Are you prepared to CHANGE?

Yes/No

12. Finger Spelling: (for the family) Repetition can become frustrating for both family members and persons requesting it. Writing out words is tedious if it has to be done regularly. Finger spelling is easy, simple and quick to learn. Often no more than a letter needs to be spelt. Have you tried FINGER SPELLING?

Yes/No

C: LISTENING IN A GROUP.

The information on this sheet has been "collected" from people who have hearing difficulties in group situations.
A number of tactics, to help minimise the confusing effort of background noise are mentioned. You have probably developed some tactics of your own.

Remember that you can't except to hear everything that is said - nobody does, but you may be able to improve your ability to hear by trying some of these tactics.

In each of the following situations a few tactics are outlined. Can you add to them?

AT PARTIES

Of course, avoid noisy areas like the middle of the room, near the kitchen and close to music.
Choose a quiet corner and perhaps a smaller group of people. You may be able to find a good speaker to concentrate on. Alternatively, handing around food and drinks help a person to circulate.

AT MEETINGS

It is useful to have a copy of the agenda first.
Sitting next to someone who is willing to let you use his notes can also help.
Do you always position yourself to get the best vantage of the chairperson or main speaker at the meeting?
Letting the committee know of your hearing difficulties and informing them how they can help minimise these difficulties can be of assistance.
You may like to try out one of the special aids discussed later.

AT LECTURES

Find the best position to sit. Try the second or third row where you get a clear sound, it is good for speech-reading and you can "tune in" to the visual clues of the people in the row in front.
Devices such as a sound tripper may be used.

AT HOMES

You can control the environment at home by:-
Using soft furnishings, carpets, heavy curtains and wall hangings to minimise unwanted background noise. Placing foam under the table-cloth helps reduce "dining-room" noise.
Carefully positioning family members around the table when dining to best suit your hearing loss.
Having adequate lighting in proper places.
Arranging back ground noise. e.g., records, T.V. to be kept at a minimum volume when not actually being listened to.
Educating your family about the problems background noise can cause and how they can assist in "controlling" it.
If street noise causes difficulty, a solid high wall, shrubs and trees in the garden or "double glazing" of windows may help reduce it.

AT THE THEATRE

Find out about the theatre before you go:-

Where are the best positions to sit to get good acoustics and vision?
Are there any special aids provided for people with hearing difficulties at the particular theatre/cinema?

Find out as much about the plot before you go - so you are already "tuned in". Small live theatres often have better sound and you are situated closer to the stage for better visual information. Be prepared to go several times to a good play if necessary - it's worth it. Also be prepared to miss out some of the dialogue - "let go" and enjoy all that you can get.

Rest before you go - you will probably need to concentrate.

PARTIES AT HOME

Decide the number of people that you can handle comfortably. If you are dining, arrange guests around the table to best suit your hearing loss. Arrange the lighting so you can see clearly.

GENERAL TACTICS

Explain your loss to people and tell then how they might help you minimise difficulties. Let them know when they have helped you. People need to be aware of the right things they do. Asking for repeats creatively is one way of achieving these goals. (e.g., "I'm interested in what you're saying but I need to see your lips clearly").

Don't expect to hear everything. Try initiating conversation - introduce a topic for discussion. Useful questions, which require yes or no answers or which require the speaker to repeat only the parts of a conversation that you have missed, are worth trying. For example "Where did you say you are going after work tomorrow?" is often better than a "What did you say?" Ask for the exact information you require, rather that whole statements. As well as using tactics, you may also like to investigate special aids.

SPECIAL AIDS

1. Induction loops are sometimes installed in buildings, churches and theatres. If you wear a hearing aid with a telecoil facility ("T" switch) you may get a clearer sound using these loop systems.

2. There are other sound systems used in buildings. For example, some churches and cinemas have earphones available.

3. For meetings, a committee aid may prove helpful. A committee aid consists of a central microphone connected to an amplifier and then to either a special induction loop or an earphone. It may improve the sound quality of speech in the meeting room.

4. In a car, you might investigate a microphone connected to an earpiece to make conversation easier to follow above the background noise.

5. Some modern hearing aids have a facility for a "hand-held" or "clip" microphone to be a attached - this gives a very clear sound. Perhaps the microphone could be passed from speaker to speaker during conversation.

6. A body aid can also be "passed around" in a similar fashion at meetings and in a car to improve speech reception.

APPENDIX 4

EXCERPTS OF CLIENT'S EXPERIENCES WITH THEIR NEW HEARING AID.

(Taken from Hearing Association Tutor's Notes -Post-Fitting Session.)

ALAN Discovered "t" switch on his Hearing Aid was marvellous in church, except when everyone sang, as all he heard was the vicar singing 'solo'.

A's WIFE Said because of Alan's Hearing Aid they have become closer in their marriage, mainly through better communication.

VINCE Took quite a while to get used to hearing himself eat an apple, rustling the newspaper, but persevered - is delighted with his aid.

DICK Says he wished he'd done something about his hearing loss 20 years ago. Is getting used to adjusting volume for different situations.

D's WIFE Said he keeps coming to her saying I can hear this or I can hear that, he is like an excited child hearing things for the very first time.

DIANA Can hear her grand-daughter speaking to her now, couldn't before wearing Hearing Aid.

ISOBEL Now hears friends, and TV without the volume up. Wearing her aid has also brought harmony on the home-front.

LES Voice softer with Hearing Aid - surprised with sounds not heard for so long. Is confident now - no longer withdrawn.

L's WIFE Said they now have a normal home life, she's not worn out repeating herself and others.

COLIN Can hear birds, music, and TV. Family think it's wonderful. Adjust volume if in noisy situations.

DONALD Said it took him a long time to get round to wearing a Hearing Aid - now he thinks it's fantastic.

GEORGE Always denied he was hard of hearing - since getting his Hearing Aid he wishes he'd got one years ago. Now wears two hearing aids all the time. Has become aware of how slushy his speech had become.

G's WIFE It has made such a difference to their lives; can't believe his improved speech; has been so difficult to understand him for years - now no problem.

BRYAN Amazed at the difference his hearing aid is making in his life. For the first time in many years he heard music and was moved to tears.

HEATHER Workmates have commented how she keeps up better in conversation since wearing her hearing aid.

BEVAN Has had to ask his wife to lower her voice; she became so used to speaking loudly to him before his Hearing Aid.

APPENDIX 5.

TYPES & BRANDS OF ASSISTIVE LISTENING DEVICES (A.L.D'S) DEMONSTRATED BY THE HEARING ASSOCIATION.

Rastronics.	-neck loop TS 100. -neck loop TS 100V (has own volume control)
Oticon.	-neck loop ML 101 (for speech with 'T' on aid. Has own volume control.) -neck loop ML 102 (for T.V. Has own volume control.)
Listenaider/ Listen Plus.	Have own volume control - for speech/conversation or T.V. Battery powered, portable. Amplifies all sound. Has headphones or earphones.
Phonak.	Devices fitted through audio shoe onto Phonak hearing aids. Can use Conference microphone or *finger hand held microphone.
Oticon.	Some aids of this brand can fit an audio shoe for similar microphone as above*.
Room Loop.	Was demonstrated in Hearing Association's Social Hall thus enabling clients to try their 'T' switch.
Telephones/ Phone Aids.	All telephones present in the Hearing Association's special telephone room were demonstrated. These are constantly being upgraded by Telecom.

APPENDIX 6.

EXPERIMENTAL QUESTIONNAIRES.

(PRE-TEST ONLY)

HEARING ASSESSMENT QUESTIONNAIRE.

HEARING ASSESSMENT QUESTIONNAIRE

For question 1 please circle either (a) or (b)

1. Was it your idea, uninfluenced by anyone else, to try a hearing aid?..... (a)

or

are you trying one as a result of continued pressure from family and/or friends?..... (b)

For questions 2 to 10 please circle either YES (Y) or NO (N)

2. Do you think your hearing is below normal for your age? Y/N

3. In your opinion, do people speak as clearly as they did a generation ago? Y/N

4. Does the thought of wearing a hearing aid make you feel older? Y/N

5. Are you concerned about being seen wearing a hearing aid? Y/N

6. Are you looking forward to getting a hearing aid? Y/N

7. Do you think behind-the-ear / in-the-ear aids are tiny and INconspicuous? Y/N

8. Have other people's comments made you unhappy about getting an aid? Y/N

9. Do you feel OTHERS associate wearing a hearing aid with stupidity? Y/N

10. Do you think your hearing is absolutely normal? Y/N

For questions 11 to 12 please circle either (a) or (b) or (c)

11. How long do you expect it will take you to get used to the aid?

A day or two .....(a)
A few weeks .....(b)
A very long time .....(c)

12. Which of these terms BEST describes how you expect to hear with the aid?

Quite well after getting used to it .....(a)
Not very well .....(b)
Without any difficulty .....(c)

THE END

(PRE- & POST- TESTS)

(1). HEARING HANDICAP INVENTORY FOR THE ELDERLY.

(2). HEARING AID KNOWLEDGE & MANIPULATION QUESTIONNAIRE.

HEARING HANDICAP INVENTORY FOR THE ELDERLY.

Instructions: (PRE-TEST ONLY)

The purpose of this scale is to identify the problems your hearing loss may be causing you. Circle YES, SOMETIMES, or NO for each question. Do not skip a question if you avoid a situation because of your hearing problem.

Does a hearing problem cause you to use the phone less often than you would like?	YES	SOMETIMES	NO
Does a hearing problem cause you to feel embarrassed when meeting new people?	YES	SOMETIMES	NO
Does a hearing problem cause you to avoid groups of people?	YES	SOMETIMES	NO
Does a hearing problem make you irritable?	YES	SOMETIMES	NO
Does a hearing problem cause you to feel frustrated when talking to members of your family?	YES	SOMETIMES	NO
Does a hearing problem cause you difficulty when attending a party?	YES	SOMETIMES	NO
Does a hearing problem cause you to feel "stupid" or "dumb"?	YES	SOMETIMES	NO
Do you have difficulty hearing when someone speaks in a whisper?	YES	SOMETIMES	NO
Do you feel handicapped by a hearing problem?	YES	SOMETIMES	NO
Does a hearing problem cause you difficulty when visiting friends, relatives, or neighbours?	YES	SOMETIMES	NO

Does a hearing problem cause you to attend religious services less often than you would like? YES SOMETIMES NO

Does a hearing problem cause you to be nervous? YES SOMETIMES NO

Does a hearing problem cause you to visit friends, relatives, or neighbours less often than you would like? YES SOMETIMES NO

Does a hearing problem cause you to have arguments with family members? YES SOMETIMES NO

Does a hearing problem cause you difficulty when listening to TV or radio? YES SOMETIMES NO

Does a hearing problem cause you to go shopping less often than you would like? YES SOMETIMES NO

Does any problem or difficulty with your hearing upset you at all? YES SOMETIMES NO

Does a hearing problem cause you to want to be by yourself? YES SOMETIMES NO

Does a hearing problem cause you to talk to family members less often than you would like? YES SOMETIMES NO

Do you feel that any difficulty with your hearing limits or hampers your personal or social life? YES SOMETIMES NO

Does a hearing problem cause you difficulty when in a restaurant with relatives or friends? YES SOMETIMES NO

Does a hearing problem cause you to feel depressed? YES SOMETIMES NO

Does a hearing problem cause you to listen to TV or radio less often than you would like? YES SOMETIMES NO

Does a hearing problem cause you to feel uncomfortable when talking to friends? YES SOMETIMES NO

Does a hearing problem cause you to feel left out when you are with a group of people? YES SOMETIMES NO

NB. INSTRUCTIONS FOR THE POST-TEST WHERE CHANGED TO:

Instructions: (POST-TEST)

The purpose of this scale is to identify the problems your hearing loss may be causing you. Circle YES, SOMETIMES, or NO for each question. Do not skip a question if you avoid a situation because of your hearing problem. If you use a hearing aid, please answer the way you hear with the aid.

HEARING AID KNOWLEDGE & MANIPULATION QUESTIONNAIRE.

PART ONE - HEARING AID KNOWLEDGE

In this section your hearing aid knowledge is assessed. Please circle your answer.

1. To clean an ear mould, you should use a slightly damp cloth and.....

(a) water. (b) cleaning fluid. (c) alcohol. (d) solvent

(e) do not know (f) other (please state)_____

2. Hearing aid batteries should be kept in a .....

(a) hot dry place. (b) somewhere damp. (c) no where in particular.

(d) cool dry place (e) do not know. (f) other(please state)_____

3. Batteries for a hearing aid can be obtained from.....

(a) most chemist shops. (b) the Hearing Aid clinic.

(c) the Hearing Association. (d) all the above (e) do not know.

4. When a hearing aid is not used for an extended period of time, what precautions should be taken?

_____

_____

_____

5. What do the letters 'O', 'M' and 'T' on a hearing aid stand for?

O- _____

M- _____

T- _____

6. When should the 'M' setting be used?

_____

7. When should the 'T' setting be used?

_____

_____

8. Does a hearing aid prevent hearing loss? YES / NO

PART TWO - HEARING AID MANIPULATION

Behind-the-Ear Aid Manipulation.	**Scoring**
1. Replace Battery.	2 pts
2. Demonstrate switching between Microphone & Telecoil.	2 pts
3. Connect aid to earmould correctly.	2 pts
4. Demonstrate how to insert aid.	4 pts
5. Knows how to operate the volume control.	2 pts

Total (Out of 12) = _____

In-the-Ear Aid Manipulation.	
1. Replace Battery.	2 pts
2. Demonstrate how to insert aid.	4 pts
3. Knows how to operate the volume control.	2 pts

Total (Out of 8) = _____

Note: In the Pre-test, instead of inserting the aid, subjects are awarded 2 points if they determine the correct ear, and a further 2 points if they have the aid orientated correctly.

Answers & Scoring For Hearing Aid Knowledge Section.

		Scoring
1.	Water	1 pt.
2.	Cool Dry Place.	1 pt.
3.	All the Above (d)	1 pt.
4.	Remove Battery	1 pt
	& either keep covered/protected or clean aid.	1 pt
5.	O=off	1 pt.
	M=Microphone	1/2 pt.
	T= Telecoil	1/2 pt.
6.	To turn the aid on or in normal use.	1 pt.
7.	When in a Loop system or when a suitable inductive coil is in operation.	1 pt.
8.	No	1 pt.

Total (Out of 10) = _____

(POST-TESTS ONLY)

HEARING AID REVIEW.

HEARING AID REVIEW.

In this section, you are asked to assess your daily use, satisfaction with, and performance of your hearing aid.

Please circle the response which you believe gives an accurate indication of your CURRENT situation.

---

1. Do you use your aid.....
(i) Every day
(ii) Most days
(iii) Some days
(iv) Only occasionally
(v) Not at all

---

2. When you wear the aid, do you use it.....
(i) All day long
(ii) Most of the day
(iii) About half the day
(iv) Less than half the day
(v) Only short periods

---

3. How many hours a day do you think you use it on an **average day**.....
(i) Less than 2
(ii) Between 2 and 4
(iii) Between 4 and 8
(iv) More than 8

---

4. Have your family, friends and close associates been helpful to you in getting used to the aid?
(i) YES.
(ii) NO.
(iii) There is no-one to help me.

---

5. Are you getting more enjoyment out of life since you obtained the hearing aid?
(i) YES (ii) NO

---

6. In the following situations, how do you rate the hearing aid? Please circle the appropriate word.

(a) In person to person conversation..... Very Good / Good / Average / Poor / Useless
(b) In a group of family or friends at home..... Very Good / Good / Average / Poor / Useless
(c) Listening to music..... Very Good / Good / Average / Poor / Useless
(d) Listening to TV (or radio) news..... Very Good / Good / Average / Poor / Useless
(e) With a group of people in noisy conditions (i.e., club, bus, pub, etc).. Very Good / Good / Average / Poor / Useless

---

7. Please indicate - by putting a circle around them - which of the following words or expressions describes your feelings **NOW** about the hearing aid and its use: .....

DIFFICULT TO INSERT: CONSPICUOUS: HELPFUL: TIRESOME:

MAKES ME LESS TENSE: BOOSTS MY CONFIDENCE: MAKES ME FEEL STUPID

EASY TO USE: NOT VERY HELPFUL: NOISY: DIFFICULT TO MANIPULATE:

BENEFICIAL IN COMPANY: UNCOMFORTABLE: INVALUABLE:

UNNECESSARY: INDISPENSABLE: REGRET NOT OBTAINING ONE SOONER

---

8. Please try to assess your satisfaction with the hearing aid on the ten-point scale below. Circling 1 means that you are totally dissatisfied. Circling number 10 means that you are completely satisfied. Try to assess how satisfied you are:

Totally Dissatisfied	1	2	3	4	5	6	7	8	9	10	Totally Satisfied

---

9. If you have two hearing aids (one for each ear), do you wear both hearing aids ..... (Please circle your answer).

1- all the time
2- most of the time
3- half the time
4- occasionally
5- never
6- does not apply as I only have one hearing aid.

---

10. Why do you wear both aids as often as you do?

_____

_____

_____

---

11. Please try to assess your satisfaction with the *rehabilitation course* that you have just completed. Circling 1 means that you are totally dissatisfied. Circling number 10 means that you are completely satisfied. Try to assess how satisfied you are:

Totally Dissatisfied. 1 2 3 4 5 6 7 8 9 10 Totally Satisfied.

---

12. Has your hearing aid ever been sent for repairs? Yes/No

If yes, how Often? _____

How long did you have to wait? _____

Comments_____

---

13. Who paid for the aid?

(a) A.C.C.
(b) War Pension.
(c) Self.
(d) Other. _____

---

14. Over the period that you obtained your hearing aid would you describe the 'instruction' that you received as:

(a) Sufficient.
(b) Insufficient.
(c) Can not say.

---

15. Was your hearing problem adequately explained to you prior to being fitted with a hearing aid? Yes/No

---

16. Do you think the service provided by the Hearing Aid Clinic is adequate? Yes/No

If not, what was unsatisfactory about the service(s) provided?

_____

_____

How could it be improved?

_____

_____

THE END.

APPENDIX 7

EXPERIMENTAL & CONTROL GROUP

CONSENT FORMS

&

INFORMATION SHEETS

Consent Form (Experimental Subjects)

The Project

The project involves a combined (Hospital/ Hearing Association/ Canterbury University) hearing aid rehabilitation program.
The basic aim of the project is to implement and evaluate this rehabilitation program.

Time Required

All subjects will attend the normal hearing aid fitting session and hearing aid check-up session at the Hearing Aid Clinic.
As part of this project, all subjects are asked to complete a 30 minute pre-hearing aid assessment session immediately following their hearing test.
You may then be asked to attend a program requiring approximately 3 hours of your time. This will include 3 one hour sessions at the Hearing Association (9 Beveridge Street).

Risks Associated With Participation

At no stage in this project is your health or well-being placed at risk.

Right Of Withdrawal

If at any stage you can no longer participate in this project, you may simply withdraw forthwith.

I agree to participate in the project described above.

Signature_____ Date_____

Name _____

INFORMATION SHEET (EXPERIMENTAL GROUP)

This project, which has been approved by the Ethics Committee of the Canterbury Area Health Board, involves combining the already existing services offered by the Hearing Aid Clinic and the Hearing Association into a comprehensive hearing aid rehabilitation program.
The existing Hearing Aid Clinic services include:

1. Auditory Assessment.	(Hearing tests).
2. Hearing Aid Fitting.	(Actually receiving and trying on your hearing aid).
3. Hearing Aid Follow-Up.	(A check-up to assess your progress with the new hearing aid).

The existing Hearing Association services include:

1. A Hearing Aid Orientation Program.
2. Hearing Tactics.
3. Information on Assistive Listening Devices.
4. Speech Reading.
5. Auditory & Memory Training.
6. Family Counselling

What I want to do then, is put all this together so that you, and future hearing aid wearers, can benefit from such a comprehensive service.

However, an evaluation of this program is essential in order to reveal whether or not it actually offers any real benefits. As such your co-operation is an important part in establishing the potential benefits of this service.

The total amount of time involved, above that which is currently required when receiving a hearing aid, is only 3 hours and this is spread over a period of 5-6 months! Three sessions at the Hearing Association will be required.

All those who participate in this program will have their Hearing Association membership fee (normally $10 per year) paid for them for one year. Continued membership is also most welcomed.

NEIL SATHERLEY.
PSYCHOLOGY DEPT.,
CANTERBURY UNIVERSITY.

Consent Form (Control Subjects)

The Project

The project, which has been approved by the Ethics Committees' of both the Canterbury Area Health Board and the University of Canterbury, involves examining various factors related to wearing a hearing aid.

Time Required

All subjects are asked to complete a 30 minute pre-hearing aid assessment session immediately following their hearing test and a 30 minute assessment session after they have had their aid for approximately 6 months.

Risks Associated With Participation

At no stage in this project is your health or well-being placed at risk.

Right Of Withdrawal

If at any stage you can no longer participate in this project, you may simply withdraw forthwith.

I agree to participate in the project described above.

Signature_____ Date_____

Name _____

INFORMATION SHEET (Control Group)

THE PROJECT

This project, which has been approved by the Ethics Committees of both the Canterbury Area Health Board, and the University of Canterbury, involves examining various factors related to wearing a Hearing Aid.

TIME REQUIRED

All subjects are asked to complete a 30 minute pre-hearing aid assessment session following their hearing test, and a 30 minute assessment session after they have had their aid for approximately 6 months.

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At no stage in this project is your health or well-being placed at risk.

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NEIL SATHERLEY.
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APPENDIX 8.

MODIFIED HEARING AID KNOWLEDGE QUESTIONNAIRE.

MODIFIED HEARING AID KNOWLEDGE QUESTIONNAIRE.

IF YOU OWN AN AID THAT SITS BEHIND YOUR EAR THEN PLEASE ANSWER THE QUESTIONS IN SECTION ONE BELOW. IF YOUR AID IS ONE THAT SITS ENTIRELY IN YOUR EAR THEN GO DIRECTLY TO SECTION TWO.

SECTION ONE .

TO BE COMPLETED BY SUBJECTS WITH A BEHIND-THE-EAR AID (i.e., an aid which sits behind the ear).

Please write your answers in the space provided.

1 . What, if anything, do you use to clean the ear mould?

_____

_____

2 . Ideally, under what conditions should hearing aid batteries be stored? (For example, what is considered as the appropriate temperature range?)

_____

_____

3 . Where do you get your hearing aid batteries from?

_____

_____

4 . Where else can batteries for a hearing aid can be obtained from?

_____

_____

5 . When a hearing aid is not used for an extended period of time, what precautions should be taken?

_____

_____

6. What letters do you have on your aid? (e.g., MTO; THL; NHO)

_____

_____

_____

7. What does each of these letters represent? (For example, if your aid has the letter "T" on it for what purpose would you switch your aid to that position?)

_____

_____

_____

_____

_____

_____

8. Does a hearing aid prevent hearing loss? (Please circle your answer)

YES. NO. DO NOT KNOW.

SUBJECTS WITH A BEHIND-THE-EAR AID FINISH HERE.

SECTION TWO.

TO BE COMPLETED BY SUBJECTS WITH AN IN-THE-EAR AID (i.e., an aid which sits entirely in your ear).

Please write your answer in the space provided.

1. What, if anything, do you use to clean your aid?

_____

_____

2. Ideally, under what conditions should hearing aid batteries be stored? (For example what is considered as the appropriate temperature range?)

_____

_____

3. Where do you get your hearing aid batteries from?

4. Where else can batteries for a hearing aid can be obtained from?

5. When a hearing aid is not used for an extended period of time, what precautions should be taken?

THE END.